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THE LANCET

Mexico City, Mexico, November 16–20, 2004

www.thelancet.com

Ministerial Summit on Health Research

Global Forum for Health Research

THE LANCET

A collection of *Lancet* papers to inform debate at the Ministerial Summit on Health Research and Global Forum for Health Research, November 16-20, Mexico City, Mexico

THE LANCET

Mexico City, Mexico November 16–20, 2004

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Introduction

This collection of papers signals what should be the most important health conference of 2004. The World Health Organisation and Government of Mexico have convened a Ministerial Summit on Health Research from November 16-20, 2004, in Mexico City, Mexico. This summit will run in parallel with this year's Global Forum for Health Research.

Nothing is possible for those working to eradicate disease or alleviate disability without a functioning health system. Yet a campaign to strengthen health systems has little of the fervour and passion surrounding Roll Back Malaria or Stop TB. And, unlike HIV-AIDS, the notion of a failing health system is unlikely to galvanise non-governmental organisations or provoke public protests. This reluctance to comprehend the enormous need for health-system capacity, human resources, equity, and quality is utterly perverse. It has been a glaring gap in the work of international agencies, such as the World Health Organisation.

This series of papers aims to draw a line in this history of neglect. Thanks to the superb efforts of Andy Haines and Cesar Victora, *The Lancet* is publishing work that sets out a new and clear framework of thinking for building and protecting health services. The need to debate these issues matters because in 2005 there will be major reviews of how far the world has reached along its path to the Millennium Development Goals. At present, the MDG deadline of 2015 looks ludicrously optimistic. Part of the reason for a prevailing despair about progress is that there is so little infrastructure on which to hang initiatives for tackling poverty and inequality.

The great danger is that after this *Lancet* series has been published, after ministers and health workers have been to and gone from the Mexico summit, and after WHO has published its work plans and promotional material, we will all return to a state of passive concern and well-meaning but unrealised intention. *The Lancet* therefore issues a quasi-permanent call for papers about health-systems and how to improve them. Little that the journal publishes has much meaning unless we get the system right. Please read these papers–they say things that matter to you and me.

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Overcoming health-systems constraints to achieve the Millennium Development Goals

Phyllida Travis, Sara Bennett, Andy Haines, Tikki Pang, Zulfiqar Bhutta, Adnan A Hyder, Nancy R Pielemeier, Anne Mills, Timothy Evans

Lancet 2004; 364: 900–06

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Effective interventions exist for many priority health problems in low income countries; prices are falling, and funds are increasing. However, progress towards agreed health goals remains slow. There is increasing consensus that stronger health systems are key to achieving improved health outcomes. There is much less agreement on quite how to strengthen them. Part of the challenge is to get existing and emerging knowledge about more (and less) effective strategies into practice. The evidence base also remains remarkably weak, partly because health-systems research has an image problem. The forthcoming Ministerial Summit on Health Research seeks to help define a learning agenda for health systems, so that by 2015, substantial progress will have been made to reducing the system constraints to achieving the MDGs.

In 2000, the UN Millennium Declaration was signed by 189 countries, and translated into eight Millennium Development Goals (MDGs) for development and poverty eradication.[1] Three of the eight MDGs are directly related to health (reducing child mortality; improving maternal health; and combating HIV/AIDS, malaria, and other diseases). The ambitious nature of these goals—which are supposed to be achieved by 2015—coupled with concern about the massive health challenges being faced by the world's poorest countries, has led to a growing momentum within the field of global health. This momentum in part takes the form of a series of high-profile global health initiatives, including the Global Fund to Fight AIDS, TB and Malaria, Stop TB, Roll Back Malaria, The Presidential Emergency Plan for AIDS Relief, and the Global Alliance for Vaccines and Immunization.

Recent evidence, however, suggests that based on current trends many low-income countries are unlikely to achieve the MDG health targets by 2015.[2,3] Even more worrisome is that those countries furthest away from the targets—ie, those with the worst health statuses—are least likely to make substantial progress. This is despite the fact that for the health problems that must be tackled to reach the MDGs, there are a growing number of effective and affordable interventions, as well as increasing international assistance for specific diseases, characterised by the emergence of billion dollar funds. Rather, there is growing consensus that a primary bottleneck to achieving the MDGs in low-income countries is health systems that are too fragile and fragmented to deliver the volume and quality of services to those in need. For example, Chen[4] describes the "double crisis" of devastating disease and overwhelmingly failing health systems in many low-income countries. The High Level Forum on achieving the Health Millennium Development Goals[5] identified major shortfalls in the health workforce, lack of donor coordination, and weak information systems as critical challenges to achieving the Millennium Health Goals. The *Lancet* series on child survival[6] noted the critical need for strengthened health systems to achieve child health gains, and this year's World Health Report argued that "The 3 by 5 initiative [to provide 3 million people with access to antiretrovirals by 2005] cannot be implemented in isolation from a regeneration of health systems."[7]

While stronger health systems appear to be a prerequisite to achieving the health MDGs, there is currently little direct focus on systems strengthening. The drive to produce results for the MDGs has led many stakeholders to focus on their disease priority first, with an implicit assumption that through the implementation of specific interventions the system will be strengthened more generally. Experience to date, however, suggests that if health systems are lacking capabilities in key areas such as the health workforce, drug supply, health financing, and information systems, they may not be able to respond adequately to such opportunities. Furthermore, there is concern that already weak systems may be further compromised by over-concentrating resources in specific programmes, leaving many other areas further under-resourced.

This article aims to assist the development of a greater and more widely shared understanding of approaches to health-system strengthening. It uses the MDGs as a starting point, and reviews the advantages and limitations of pursuing health systems strengthening through the lens of individual service or disease specific initiatives. It argues that part of the challenge is to get more existing knowledge into practice, but that a stronger body of knowledge about which system strengthening strategies are effective, and which are not, is also urgently needed. If these challenges do not receive serious and sustained attention, there is a risk that many current praiseworthy efforts will be not achieve their goals. This is the first of a number of *Lancet* papers before the Ministerial Summit on Health Research (to be held November 16–20, 2004, in Mexico City), which will focus particularly on developing health policy and systems research, on knowledge dissemination, and on promoting the use of findings by decision makers.

	Examples of interventions	Examples of global initiatives
Maternal health	Skilled birth attendance; access to emergency obstetric care	Making Pregnancy Safer
Newborn and child health	Oral rehydration therapy; micronutrients; immunisation; antibiotics for lower respiratory tract infections	Integrated Management of Childhood Illness; Global Alliance for Vaccines and Immunizations; Global Alliance for Improved Nutrition
HIV/AIDS	Voluntary counselling and testing; condoms; prevention of mother to child transmission; combination antiretroviral therapy	3 by 5; GFATM; Presidential Emergency Plan for AIDS Relief
Tuberculosis	DOTS strategy for tuberculosis control; DOTS plus (for treatment of multidrug resistance)	Stop TB; GFATM
Malaria	Insecticide-treated nets; effective case management; indoor residual spraying	Roll Back Malaria; GFATM

GFATM=Global Fund to Fight AIDS, TB, and Malaria.

Table 1: **Interventions and global initiatives linked to health MDGs**

Previous efforts to improve delivery of priority services

Many of the current global initiatives to achieve the health MDGs have strong service-specific or disease-specific foci (table 1). Service delivery arrangements are sometimes described in terms of vertical or horizontal approaches. Vertical approaches use planning, staffing, management, and financing systems that are separate from other services, whereas horizontal approaches work through existing health-system structures. In reality, in many low-income countries, few interventions are delivered through totally stand-alone or totally integrated approaches, but generally operate through a complex patchwork of arrangements.[2]

Over the past 30 years there have been significant shifts in international development strategies and thinking about the best mix of vertical and horizontal approaches. The Alma Ata declaration promoted a comprehensive approach to improving health with a strong emphasis on building health systems "from the bottom up" through primary health care.[8] However this vision was challenged by those who argued that to achieve a measurable effect it was necessary to focus on a limited number of cost-effective interventions through selective primary health care.[9] The emphasis on delivering cost-effective interventions resulted in an increasing array of selective programmes, often being promoted simultaneously in countries with limited capacity to deliver. The growing recognition of some of the problems resulting from multiple single-condition programmes led to more integrated approaches such as Making Pregnancy Safer and Integrated Management of Childhood Illness, which aspire to maintain focus on specific outcomes while working within existing service structures. Most recently, the number of global alliances for priority diseases has increased.

Constraints currently faced by health systems

Table 2, which uses a framework developed by Hanson and colleagues,[10] illustrates some of the major constraints to improving service delivery identified in reviews by major global health initiatives. A wide range of frameworks and instruments were used for these reviews; from short, structured checklists to detailed questionnaires and quantitative approaches to assessing barriers.[10–20] The reviews largely focus on constraints within the government system, although there is increasing recognition of the need to also examine private sector issues, in view of the scale of "out-of-pocket" spending and private provision in many parts of the world. Diagnoses of the main health-systems barriers from different intervention or programme-specific perspectives tend to be fairly consistent, albeit articulated in rather general terms. Table 2 shows that some major barriers are shared by every programme: human resources, financing, drugs and supply systems, and the generation and use of information. Reviews of other emerging priorities not specifically targeted by the MDGs, such as non-communicable diseases and injuries, have encountered similar system constraints.[21]

One key group of constraints not listed in table 2 are environmental constraints[10] (ie, those external to the health system), which include factors such as the overall policy environment, political instability, and the quality of governance. Some findings suggest that in certain countries these broad policy and institutional constraints pose greater barriers than resource constraints.[22–24] Although health systems alone cannot remove these environmental constraints, some health-system structures (such as development of stronger mechanisms to hold health-care providers accountable to communities) may moderate the consequences of such obstacles.

One limitation of many of these analyses is that they identify what the barrier is (ie, the immediate operational constraints), rather than getting at its root causes. Constraints beyond the control of individual programmes—eg, public sector employment rules, which can have a major effect on the way health services operate—may not be even identified, let alone addressed, when a disease or service specific lens is used. Moreover, it is unusual for a constraint to have a single root cause: more commonly, there are several underlying factors, which are often interdependent. Efforts to overcome a particular constraint are less likely to be successful if these relations are not taken into account.

Drawing on table 2, two distinct ways to address these systems challenges can be identified. One is that the constraints are tackled independently and in parallel for every disease or MDG goal. A second approach is that each system challenge is worked on across the diseases or MDGs. As Mogedal and Stenson[19] observe in relation to disease eradication programmes, but which holds true more generally, strong convictions in either direction are held by many actors and observers. In the following two

sections, we consider what is known about the advantages and disadvantages associated with each of these approaches.

Addressing the constraints

Parallel approaches

As discussed above, programmes specific to a service or disease can work in more or less vertical ways to achieve their goals. For example, several global initiatives are concerned with making good quality pharmaceuticals available to health facilities in a timely and reliable manner. This goal might be achieved through development of new and parallel pharmaceutical procurement and distribution systems, or by strengthening the existing pharmaceutical management system to meet the needs of all the specific initiatives. In practice, global initiatives and national programmes are using both integrated and more vertical or parallel approaches to move their agendas forward.

The primary advantage of taking an intervention-specific approach to strengthening of health systems is that it can help maintain focus by targeting a 'manageable chunk' of the system rather than taking on the whole. Targeting particular health-system constraints to the achievement of health goals may also deliver quicker returns than longer-term, broader, system-based interventions. However, although the formal evidence base is limited,[19] there are many reports from experience that problems may arise when several vertical, parallel subsystems are created within the broader health-care system. Parallel approaches are likely to result in:

- Duplications: running parallel systems for delivering drugs to health facilities will increase transport costs, and increase the number of forms that health workers need to complete to secure their drug supply.
- Distortions: creating a separate cadre of better paid health workers for the specific tasks of a programme may deplete staff from other key functions and/or demotivate staff who do not benefit from higher pay or better conditions.
- Disruptions: programmes often train health workers by taking them away from their jobs for several days or weeks, leaving their posts vacant. This training tends to be uncoordinated across programmes, and may result in the same worker receiving several training courses in a year, with a substantial loss of services being delivered.
- Distractions: similarly, the specific and uncoordinated reporting requirements of donors can lead to several forms being filled by a sole health worker for the same problem, distracting them from more productive uses of their time.

These problems suggest that even though global initiatives or national programmes are bound to maintain a primary focus upon their own particular disease or intervention, there are few circumstances when this focus should be pursued exclusively through the establishment of separate parallel systems. More rigorous assessments of the extent to which vertical versus more integrated approaches contribute to sustained overall system strengthening—and in what circumstances—are certainly needed.

	Maternal health	Child health	TB	Malaria	HIV/AIDS
Community and household level					
Demand-side barriers—individual: socioeconomic, gender effects on behaviour, access, and use of care	✓	✓	✓	✓	✓
Demand-side barriers—community: absence of social pressures to improve access	✓		✓		✓
Stigma*	✓		✓		✓
Health-service delivery					
Inequitable availability of services	✓	✓	✓	✓	✓
Multiple providers, public and private	✓	✓	✓	✓	✓
Provider behaviour to clients	✓	✓	✓	✓	✓
Case management: poor adherence, increasing drug resistance, adverse events	✓	✓	✓	✓	✓
Physical infrastructure, equipment	✓	✓	✓	✓	✓
Human resources availability and management, including payment mechanisms, quality of care, supervision	✓	✓	✓	✓	✓
Drug supplies, supply systems	✓	✓	✓	✓	✓
Service management capacity	✓	✓	✓	✓	✓
Referral and other communication failures	✓	✓	✓		
Health-sector policy, strategic management					
High level political commitment to the specific problem or programme	✓	✓	✓		✓
Financial constraints, resource allocation	✓	✓	✓	✓	✓
Insufficient coordination between donors, non-governmental organisations, government bodies	✓	✓	✓	✓	✓
Regulation or legislation to affect both public and private actors	✓	✓	✓	✓	✓
Weak links between programmes leading to inefficiencies and competition for limited resources	✓	✓	✓	✓	
Sector-wide approachs, health-sector reforms	✓		✓		
Monitoring systems, use of information—public and private sector	✓	✓	✓	✓	✓
Public policies cutting across sectors					
Macroeconomic policies, poverty reduction strategies, civil service rules and reforms	✓	✓	✓		

TB=tuberculosis. ✓Indicates challenge or barrier faced by that health priority. *Although stigma is not always perceived as a health-system issue, it is included here because health systems can reduce or increase stigma, depending on the way people are treated by providers and perhaps the availability of effective treatment.

***Table 2:* Some major barriers and challenges to improving service delivery for priority health problems, identified in reviews of major initiatives and programmes**

Taking a system-wide perspective

As we have discussed, the system barriers identified by specific initiatives and programmes are rarely unique to their own focal disease, and the discourse of some global initiatives (such as Stop TB and 3 by 5)[16] emphasises their need to take heed of the broader health-system context, and to contribute to overall system strengthening. For example, service-specific or disease-specific programmes may work with human resource planners at the ministry

	Disease-specific response	Health-system response
Constraint		
Financial inaccessibility: inability to pay, informal fees	Exemptions/reduced prices for focal diseases	Development of risk pooling strategies
Physical inaccessibility: distance to facility	Outreach for focal diseases	Reconsideration of long term plan for capital investment and siting of facilities
Inappropriately skilled staff	Continuing education and training workshops to develop skills in focal diseases	Review of basic medical and nursing training curricula to ensure that appropriate skills included in basic training
Poorly motivated staff	Financial incentives to reward delivery of particular priority services	Institution of proper performance review systems, creating greater clarity of roles and expectations regarding performance of roles, review of salary structures and promotion procedures
Weak planning and management	Continuing education and training workshops to develop skills in planning and management	Restructuring ministries of health, recruitment and development of cadre of dedicated managers
Lack of intersectoral action and partnership	Creation of special disease-focused cross-sectoral committees and task forces at national level	Building systems of local government that incorporate representatives from health, education, agriculture, and promote accountability of local governance structures to the people
Poor quality care amongst private sector providers	Training for private sector providers	Development of accreditation and regulation systems

Table 3: Typical system constraints and possible disease-specific and health-system responses

of health to increase the supply of nurses able to work with tuberculosis, or they might work within the sphere of a sector-wide approach to improve donor coordination for their particular intervention. However, in view of programmes' specific mandates, their responses may be circumscribed and fail to consider possible broader system-wide responses and effects. The question is, does this matter? We argue that it does.

First, such limitations can unnecessarily restrict the policy options considered. Table 3 is designed to illustrate that there are different possible responses to typical health-system constraints (not to recommend one particular approach: as is discussed later, much is still unknown about appropriate health-system strengthening strategies). The first set of responses are those that a disease-focused perspective might pursue. These tend to focus on more 'microlevel' solutions, such as outreach for focal diseases, or financial incentives for priority services. The second set are responses that a health-systems approach might generate instead, such as reviewing long-term plans for locating facilities, or creating proper performance review systems. Even when dedicated initiatives do take a more systemic approach, they tend to focus on specific subsystems such as surveillance or drug supply systems, rather than on "macro" issues such as overall financing mechanisms, the role for the private sector, or ministerial restructuring. The point here is that, although we do not yet know for certain whether (and when) broader architectural responses are necessarily better than disease-specific ones, the imposition of a disease-specific lens means that broader health system-wide responses are not even part of the solution set considered.

Second, some of the disease-specific strategies identified in table 3 may crowd out ongoing activities within the health sector. A study of polio eradication indicated that the majority of district level staff reported that regular work was disrupted or dropped in the lead up to national immunisation days.[19] Although polio vaccination by its nature only has transient effects, this example illustrates the potential hazards. Disease or service-specific strategies are also likely to become less effective and less sustainable as more global initiatives adopt them. One or two workshops a year training health workers in HIV/AIDS counselling techniques may be manageable, but when this is combined with additional workshops on tuberculosis, malaria, and immunisations, then health workers spend too long away from their posts.

Third, a disease-specific focus might help meet short-term goals, but can crowd out the development of strategies that will sustain those gains. In view of the many interactions within a health system, there are commonly several factors contributing to a particular problem. The broader approaches to health system strengthening typically aim to tackle these root causes of failure. They therefore also usually take longer, and are more difficult to advance; but without them the easier, shorter term solutions (for example, increased funds, managers' training) are likely to lead to only limited gains.[25] In practice there is often a tension between short and longer term goals, and the time horizon that decision makers adopt might be one of the critical factors in determining whether service-specific approaches to health-system strengthening or broader architectural responses are indicated.

In summary, the advantages claimed of a system-wide approach are that such a strategy increases the range of options and tackles root causes, and the benefits accrue to several, not single, priorities—ie, efficiencies are possible. The disadvantages are that benefits take longer to accrue and the effort may become unfocused and unmanageable. However, we argue that taking a systemic or "health-systems" approach does not mean abandoning priorities, losing a focus on outcomes, or trying to do everything at once. It simply means recognising that health systems have a complex anatomy and physiology, and that one or more root causes may need to be tackled to get significant long term improvements in coverage and quality of care.

Accelerating achievement of MDGs through improved knowledge on how to strengthen health systems

Disease or service-specific strategies to strengthen health systems on their own are unlikely to bring about the improvements in health systems needed to achieve the MDGs. Similarly, use of an intervention-specific or

disease-specific lens to define the research agenda for health policy and systems serves to generate much useful knowledge,[26] but on its own is incomplete. Such an approach must be complemented by a substantial additional body of knowledge and action that takes the functioning of the health system as its core concern.

What would such a programme of work look like? While health policies and systems have been a relatively neglected area of work in low and middle income countries, the efforts of the past 40 years have made clear contributions, and in certain areas there is a growing body of knowledge about effective strategies to strengthen health systems. This information has helped to provide a more balanced debate about the pros and cons of strategies that have sometimes been promoted more on the basis of ideology rather than evidence. For example, several studies during the 1990s improved our understanding of the circumstances in which strategies such as contracting with and franchising private sector providers (a process common to many global initiatives), might—or might not—achieve their intended results.[27,28] Although user fees for health services were strongly advocated by various agencies during the 1980s as a means to overcome financial constraints, a sound body of knowledge now shows that user fees are likely to have negative effects upon access to care, especially for the poor, unless certain preconditions are met.[28]

Knowledge has also expanded through approaches that some might not put under the rubric of formal research, but which have nevertheless helped decision-makers to better understand and address the problems faced by their health systems. Examples include the increase in relatively informal local "action-research", the development of national health accounts to get a complete picture of the sources and uses of funds, and tools such as stakeholder analysis that are designed to help people navigate the complex political arena within which policies are implemented.

Despite these achievements, there is still an extraordinarily weak evidence base to support (or challenge) the majority of the health-system strengthening strategies now being proposed and implemented. Almost 10 years ago, WHO's Ad Hoc Committee on Health Research highlighted health policy and systems research as an especially neglected area.[29] The situation is only slightly better today. The Commission on Macroeconomics and Health[30] found that existing evidence on constraints to improving service delivery, and on strategies for overcoming them, was still thin. In many cases, knowledge is deficient about ways to organise, pay for, and oversee health services to get sustained, nationwide improvement in resource-constrained settings. Almost as important is that there are still few answers about how to manage and sequence the necessary changes in health systems. These and other barriers identified in table 2 are unlikely to be overcome without a much more concerted and substantial investment in the knowledge foundations of health systems. We believe there is danger of wasting investments in intervention-specific research if we do not increase knowledge on ways to strengthen health systems in parallel. As a recent *Lancet* leader argued, we need nothing short of a "revolution" in health-systems research.[31]

Lastly, it is important to note that whilst the focus of this paper is on the knowledge agenda, the challenge of getting more knowledge into practice also needs continued attention—and, indeed, is a crucial part of the agenda of the upcoming Ministerial Summit on Health Research.

***Panel*: Some reasons for neglect in health-policy and systems research**

- Health systems have an image problem: visible or emotive topics such as child deaths or polio campaigns engage stakeholders in ways that interventions for strengthening planning or accountability mechanisms do not
- Health-systems research also has an image problem: other forms of research such as basic science and drug discovery are prestigious while health systems research is seen as fluffy, pedestrian, and applied. This attitude is caused by divergent views on the types of systems issues that can be researched, and to methodological challenges
- Divergent views on the types of questions amenable to scientific enquiry: some believe that health-system problems are primarily political, and therefore best solved using common sense rather than evidence
- Answers from such research can be slow to arrive and uncertain, because of the long-term nature of health-systems change, and the complex and indirect links to final outcomes
- Generalisation can be difficult, because the effects of interventions crucially depend on the environment in which they are implemented
- Health-systems research may not have a disease-specific or intervention-specific focus, so there are fewer opportunities for research funding
- Disinterest and difficulty in assessment: because the interventions are part of large, messy reforms with strong political imperatives, systematic evaluations difficult to design and may be difficult to defend
- Restricted research capacity, and a research workforce that is multidisciplinary and therefore does not have an obvious institutional home with clear career structures
- The right questions are not being asked: improved understanding is needed about the types of research that really change the way decision-makers think

Advancing the learning agenda

If the case for greater learning about health systems is so strong, then why does health policy and systems analysis fail to get more support? Two examples illustrate the extent of the problem. An analysis by the Alliance for Health Policy and Systems Research reported that health-system research may attract only 0·018% of total health expenditure in low income countries.[32] And only 48 of WHO's 1100 collaborating centres report a health systems research and development focus (Panisset U, WHO/RPC, personal communication). There may be no universally agreed answers to this question, but many plausible reasons can be advanced (panel).

Several of the issues we have identified are amenable to change. Research priorities could be linked more closely to questions that policy makers (and research funders) want to see addressed. The unit of analysis from which conclusions are drawn needs to fit the questions that are being asked, otherwise opinions about the limited relevance and applicability of health systems research are simply reinforced. For example, small pilot studies cannot fully inform policy makers about whether and how to scale-up nationwide, because they do not take account of factors such as the different institutional arrangements needed. Methodological challenges need to be tackled, and this cannot be done by any one discipline alone, because a range of study designs and mix of qualitative and quantitative approaches may be needed, depending on the question being asked. Of all the methodological challenges in health-systems research, one of the most contentious issues is cross-country comparative analysis, since health systems operate in such different contexts. As Janovsky and Cassels point out, health-policy and systems research has to develop its own yardstick of what constitutes valid and reliable research.[33] More effort to address these methodological challenges is indeed one of the reasons that greater investment is needed—and warranted.

Knowledge could also be substantially improved with existing methods. But to make a convincing case for increased funding for health-systems research, the dimensions of the research agenda must also be fleshed out more concretely, with their value and usefulness to decision-makers clearly articulated. For example, rigorous assessments of innovative systems strategies in terms of their effects on specific interventions might help to register this research as a good buy amongst the disease and intervention-specific programmes. More ambitious multicountry studies might permit the parsing out of the relative importance of context and facilitate more robust generalisations on systems strengthening of interest to policy makers. The scope of this research agenda will be more thoroughly explored in a subsequent article in *The Lancet*.[34]

The combination of greater investment in health-systems research and a carefully thought through strategy for the use of this money could help accelerate the development of the evidence base on health systems and help to remove the systems barriers to the achievement of MDGs.

The identification of common barriers to the implementation of a range of priority interventions, present in many countries, suggests the need for international cooperation on health-systems research to tackle shared priorities. Evidence also suggests that policy makers are more likely to take greater heed of research findings when these address the problems they face, and when there are several studies that lead to similar conclusion—including studies from other countries. The need for international cooperation in no way diminishes the need for local and national priority setting for research, in view of the critical need for any health-policy and systems research agenda to be grounded in and responsive to pressing health-system problems.

Of course, health-policy and systems research cannot address all the barriers to improving service delivery. But it can help, and we believe far more, and better quality research needs to be done. As Freedman and colleagues argue, "MDGs formulated in disease specific terms must not become the excuse for failing to prioritise systemic solutions ... [the] perpetual problem is to leap from one solution to another, never grappling the long-term problems".[14] More concerted action, with a longer term vision, explicit attention to policy relevance, greater innovation in methods, strengthened commitment to building developing country research capacity, and greater investment are needed. An international task force is being convened by WHO to identify healthsystems research priorities, propose strategies to raise funding to address these priorities, and generate consensus about how to move forward. The task force will consult widely on suggested topics for research, which will be outlined in a subsequent paper in *The Lancet*.[34] The task force will present its recommendations to the Ministerial Summit on Health Research later this year, with the intention that a 10-year commitment to this learning agenda will ensue, so that by 2015, substantial progress will have been made in removing health-system constraints to achieve the MDGs.

Conflict of interest statement

A A Hyder is a consultant to WHO. A Mills is paid part-time Chair of the Board of Alliance for Health Policy and Systems Research, which is an advocacy body for health-systems research. The other authors declare no conflict of interest.

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Informed choices for attaining the Millennium Development Goals: towards an international cooperative agenda for health-systems research

*Task Force on Health Systems Research**

Lancet 2004; 364: 997–1003

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Comments on the research agenda should be sent to Ulysses Panisset (panissetu@who.int; see panel 2)

Health systems constraints are impeding the implementation of major global initiatives for health and the attainment of the Millennium Development Goals (MDGs). Research could contribute to overcoming these barriers. An independent task force has been convened by WHO to suggest areas where international collaborative research could help to generate the knowledge necessary to improve health systems. Suggested topics encompass financial and human resources, organisation and delivery of health services, governance, stewardship, knowledge management, and global influences. These topics should be viewed as tentative suggestions that form a basis for further discussion. This article is part of a wide-ranging consultation and comment is invited. The potential agenda will be presented at the Ministerial Summit on Health Research in November, 2004, and revised in the light of responses. Subsequently, we hope that resources will be committed to generate the evidence needed to build the equitable, effective, and efficient health systems needed to achieve the MDGs

The UN Millennium Development Goals (MDGs; panel 1) represent a compact between rich and poor nations to improve human development. The MDGs related to child health, maternal mortality, and diseases such as HIV/AIDS are far from being achieved by the deadline of 2015, particularly in sub-Saharan Africa.[1] A previous article[2] in *The Lancet* has indicated how health-systems constraints are impeding the implementation of major global initiatives for health and the attainment of the MDGs and how research could contribute to overcoming these barriers to progress. Improving health systems has the potential to assist progress towards the MDGs in the near term by promoting more equitable access to effective interventions.

Researchers need to address the key challenges faced by decision makers—for example in undertaking health-system reforms and taking effective interventions to scale—recognising that there is not always one optimal decision, but that research evidence should play a greater role in influencing policy. In view of the limited attention and funding devoted to this area, substantial methodological challenges and low perceived generalisability of findings from single sites, greater international collaboration is needed. Hence, WHO convened a task force to suggest topics where international collaborative research could help to generate the knowledge necessary to improve health systems and, thus, the prospects for attaining the MDGs. Although the focus is on the MDGs, many of the topics have wider relevance.

A wide range of decisions must be made globally, nationally, and locally regarding how to address the problems that need to be overcome in order to achieve the MDGs. Needs, values, priorities, and availability of resources vary from country to country. Each country must make its own choices in relation to its specific circumstances. At the same time, most countries are faced with similar questions, such as:

- How best to address shortages of human resources for health and poor health-worker performance?
- How best to increase the use of effective forms of health care and decrease the use of ineffective forms of care?
- How to control the use of pharmaceuticals to ensure that limited resources are well spent?
- How best to integrate programmes targeted at priority problems such as HIV/AIDS into existing health-care systems?

All these choices require information about the specific conditions in a particular country and judgments that take into account the values of the country. Information from relevant and reliable evaluations and experience from other countries is also needed to inform judgments about the probable effects of alternative policies. This information contributes to global knowledge.

The Ad Hoc Committee on Health Research developed a five-step process for research priority setting[3] and there have been a number of subsequent approaches focusing particularly on specific diseases or risk factors involving, for example, epidemiological data on burden of disease.[4] However, health systems underpin the effective pre-

***Panel 1:* The Millennium Development Goals in summary**

Goal 1: Eradicate extreme poverty and hunger
Goal 2: Achieve universal primary education
Goal 3: Promote gender equality and empower women
Goal 4: Reduce child mortality
Goal 5: Improve maternal health
Goal 6: Combat HIV/AIDS, malaria, and other diseases
Goal 7: Ensure environmental sustainability
Goal 8: Develop a global partnership for development

For a full list of MDGs, their targets and indicators, see http://unstats.un.org/unsd/mi/mi_goals.asp

vention and care of a range of health problems, and therefore the development of a research agenda poses particular challenges. It has been suggested that in these circumstances, interpretive approaches based on the consensus views of informed participants may be attractive because of "their ability to juggle multiple assumptions and objectives".[5] There are, of course, different ways in which topics for health-systems research can be identified, and a number of stakeholders that have legitimate perspectives on what is important, including policymakers, health personnel, and civil society. The topics outlined here represent to a large extent the thinking of the Task Force on Health Systems Research, which strove for parsimony in its approach. Analysis of the health systems constraints to achieving the MDGs,[2,6] previous work aimed at identifying needs for health systems research and setting priorities,[3,7,8] inputs from WHO staff in Geneva, and other expert contributors (see Acknowledgments), together with preliminary regional consultations by WHO, have all contributed to our thinking. We acknowledge, however, that further work is needed to develop more formal priority-setting processes for health-systems research.

The topics we present should be viewed as tentative suggestions that form a basis for further discussion. Researchers, policymakers, health personnel, research funding organisations, non-governmental organisations, and the wider public are all invited to comment on these topics as part of a wide-ranging consultation, of which this article is part. It is hoped that by the time of the Ministerial Summit on Health Research in Mexico in November, 2004,[9] it will be possible to agree on the agenda and subsequently achieve a commitment of resources to generate the evidence needed to build the equitable, effective, and efficient health systems required to achieve the MDGs.

Research topics

There is a need for health-systems research to inform decisions at local, national, and international levels. We have highlighted topics relevant to decisions at each of these levels (table 1). We have also indicated which MDGs might be affected by research on each of the topics. Attainment of the MDGs will be influenced by a wide range of factors within and outside health systems, so the table should be seen as illustrative rather than comprehensive. For each proposed topic we suggest that the following questions should be addressed:

- What is the problem and why is it important?
- What is known and what is not known?
- What research is needed and how would it help?

We are preparing brief templates that address these questions for each proposed topic (see panel 2). In the remainder of this article we provide an overview of a proposed international agenda for health systems research focusing on topics that are likely to be of common interest across many countries.

Financial and human resources

Community-based financing and national health insurance

Low and middle income countries in general provide very patchy financial risk protection to their populations, with resulting problems including households driven into poverty by catastrophic health expenses, and low levels of access to care.[10,11] Research is needed to assess the financial implications of universal coverage in different settings, to assess the extent to which people will contribute to its costs from their own income, and which costs will need to be covered from general tax revenues or employer contributions. The appropriate benefit package, its costs, and feasibility of implemen-

	MDG*					
	1	4	5	6	7	8
Financial and human resources						
Community-based financing and national health insurance	✓	✓	✓	✓		✓
Human resources for health at the district level and below	✓	✓	✓	✓		
Human resource requirements at higher management levels	✓	✓	✓	✓		
Organisation and delivery of health services						
Community involvement	✓	✓	✓	✓	✓	
Equitable, effective and efficient health care	✓	✓	✓	✓		
Approaches to the organisation of health services	✓	✓	✓	✓		
Drug and diagnostic policies	✓	✓	✓	✓		✓
Governance, stewardship, knowledge management						
Governance and accountability	✓	✓	✓	✓	✓	
Health information systems	✓	✓	✓	✓	✓	
Priority setting and evidence-informed policy making	✓	✓	✓	✓	✓	
Effective approaches for intersectoral engagement in health	✓	✓	✓	✓	✓	✓
Global influences						
Effects of global initiatives and policies (including trade, donors, international agencies) on health systems	✓	✓	✓	✓	✓	✓

*See panel 1 for summary of MDGs. ✓=Improved knowledge from health-systems research could contribute to attainment of one or more of the targets for the MDG. The relationships are complex and the list is not exhaustive, because attainment of MDGs will be affected by a range of factors interacting both directly and indirectly with health. For example, improved health could contribute to reduction of poverty (MDG 1) through several mechanisms, including reducing loss of income from ill-health and catastrophic expenditures due to illness and improvements in the health of women and girls could reduce gender disparities in education (MDG 3).

Table 1: **Suggested topics for health-systems research and their potential to affect attainment of the targets for the MDGs**

***Panel 2:* Comments on the topics outlined in this article should be sent to Ulysses Panisset (panissetu@who.int)**

Readers are invited to indicate gaps in the research agenda and to suggest important research questions within the topic areas. We also welcome information about other relevant research agenda setting activities.

tation in different settings require study to identify the most efficient and equitable design features of a universal scheme.

Shortage of resources for health services, including severe limits on government funding and the known disadvantages of user fees, has encouraged many countries to look to community financing, especially voluntary, community-based health insurance,[12] as a source of additional funding. It is difficult to draw firm general conclusions from existing evidence because studies lack common definitions of community-based health insurance, evaluate different objectives, and have been criticised for methodological weaknesses.[13] Research is needed to examine the potential role of such insurance schemes in overall health-care financing arrangements, the affordability of premiums to different groups and the types of support external to the schemes that may be needed for successful functioning.

Human resources at the district level and below

Health systems cannot function without adequate and appropriate human resources, yet human-resource development receives insufficient attention and support within health research and planning.[14] Migration of health personnel causes severe difficulties for some countries, but effective policies to reduce the adverse effects are lacking.[15] Moreover, migrant remittances are an important financial source in some developing countries. The overall availability and balance of different types of personnel and skills at district and sub-district level are often inadequate and inappropriate. Mid-level health workers such as clinical assistants have played an important role in health-care delivery in countries and in situations when other cadres were not available, but these workers are poorly rewarded. Lack of availability of health professionals has resulted in renewed interest in community health workers who can potentially play an important role in achieving the MDGs, but there is a paucity of evidence about their effectiveness in low and middle income countries.[16] Evaluation is needed of approaches such as regular visiting of households, targeting high-risk groups, prescribing of potentially life-saving medications (such as antibiotics) by community health workers and community health-education programmes. We also need to know how to achieve the right balance and strength of clinical and public-health competencies at district and sub-district levels and what balance of financial and non-financial incentives would improve motivation, performance, and distribution of health workers.[17]

Human resource requirements at higher management levels

Multiple donor-driven initiatives are placing severe strains on Ministries of Health in some countries,[18] and high level coordination and analytical skills are needed to deal with demands. The increasing volume of research evidence and efforts to improve health information mean that policy makers are functioning in a complex environment that requires integration of changing knowledge, data, and political priorities. Frequent rotation of staff may reduce their ability to perform in such an environment. These factors suggest that those in leadership and strategic management positions need support, resources, and training to enable them to function effectively. Research is needed on how best to provide such support and how the existing higher education institutions, such as medical and public-health schools, can help to provide the relevant training.

Organisation and delivery of health services

Community involvement

Although there is general support for the concept of community involvement, there is a need for more rigorous research in this area. Greater clarity is needed about potential ways in which communities can contribute to improving their health status, including: strengthening accountability of service providers; participation in the governance of community-based health insurance; involvement in planning and implementation that incorporates communities' perceived health priorities and preferred strategies for dealing with them.[19]

Equitable, effective, and efficient health care

Inequities in access to health care have been documented within many low and middle income countries,[20] but little is known about how best to reduce them with much of the evidence in the form of case studies. Effective interventions are available for diseases that account for most of the burden of disease in low-income countries, including common causes of child and maternal mortality, and communicable diseases including HIV/AIDS, malaria, and tuberculosis.[21–23] These interventions are being implemented at disappointingly low rates and inequitably, at the cost of preventable suffering and millions of lives. At the same time, scarce resources are frequently being wasted on ineffective interventions. Narrowing this quality gap requires identification of strategies that scale up the use of effective practices, decrease the use of ineffective practices, and help ensure equitable access to health care. Situations such as urban slums may pose particular challenges for the delivery of care because of

population mobility, violence, and crime, and research is needed to tailor solutions to these challenges.

In many countries the majority of deaths occur at home—eg, around 70% of child deaths in Tanzania.[24] In some cases, there is failure to recognise serious illness; in others, despite recognition, available interventions are either not used or not used effectively. Delays in women seeking and accessing skilled care for childbirth lead to high maternal mortality.[25,26] Thus, evaluation is needed of approaches to improving the recognition of serious illness (particularly in women and children), appropriate care-seeking behaviour, and the implementation of effective interventions.

Many strategies for improving quality—such as audit and feedback, decision support, and educational outreach—have been tested in high-income settings, but few have been adequately assessed in low and middle income countries.[27] The rise of non-communicable diseases and HIV/AIDS in many parts of the world has led to greater emphasis on the need for better systems to manage chronic disease, which will require understanding how health systems in low and middle income countries can facilitate continuity of care, support self management where possible, and provide decision support for health workers that is consistent with scientific evidence and patient preferences.[28]

Approaches to the organisation of health services

Reforms in the organisation of health services have been presented as a key solution to inefficient and inequitable delivery of health care in developing countries. Proposed reforms included separating the functions of purchasers and providers; creating internal or quasi markets within the public sector; creating executive agencies to manage the health sector; decentralisation of health service management to local health administration levels or to local government; giving increased autonomy to hospitals and contracting out services to the private sector.[29] Mixed experiences with reforms, encompassing both failed and slow implementation, and relatively few success stories, have lead to questioning of their value, especially when applied with little adaptation to local circumstances.[30] However, published work is scattered and incomplete in coverage and often methodologically weak, making it very difficult to draw any general conclusions.

It is important to find an appropriate balance between vertical and horizontal approaches and, in particular, to identify how best to coordinate and integrate disease specific programmes into health systems. In many low and middle income countries, non-governmental organisations are key providers of care to marginal groups. However, the relation between these organisations and the public sector is often one of mistrust, affecting the delivery of care, and research is needed to understand appropriate forms of collaboration between different types of provider.

Learning from rigorous evaluation of organisational innovations is mandatory for improving the performance of health systems. A strengthened evidence base on organisational patterns and reforms would enable better advice to be given to policy makers.

Drug and diagnostic policies

People in low income countries often pay for drugs out of their own pocket and costs may amount to 60–90% of total household expenditure on health.[31] Ability to pay is also a concern for governments: increasing expenditures on drugs puts pressure on policy makers to control drug costs and ensure that funds are well spent. At the same time, low and middle income countries face additional challenges, including counterfeit drugs, major problems with the supply, distribution, and financing of essential medicines, and regulation of prescribing.[32,33] Lack of access to effective drugs leads to preventable deaths, and providing access to affordable essential drugs is one of the targets for Goal 8 (panel 1). Inappropriate use of antibiotics and antimalarial drugs can lead to drug resistance, adverse reactions, and wasted resources. In the case of diagnostic technologies, advances in molecular diagnostics and imaging have the potential to bring improved diagnosis to poor communities,[34] but also for misuse. Improved use of drugs and diagnostic technologies can improve health outcomes and, in some circumstances, can result in substantial savings without adverse health consequences. On the other hand, cost-containment strategies can have unintended effects on health and costs.

Governance, stewardship, and knowledge management

Governance and accountability

Good governance has been shown to be key to the effectiveness of general development assistance.[35] Ensuring strong systems of governance and appropriate accountability mechanisms within the health sector underpins health-sector performance. For example, health providers who are not held accountable for their performance are likely to be unresponsive to community and patient preferences; this may in turn reduce the demand for care. Corruption not only wastes money but also distorts incentives and is likely to reduce efficiency within the sector. For example, if contracts for services are awarded on the basis of personal contacts and bribes, then this is likely to affect adversely the quality of the service provided by the contractor.

Multiple aspects of corruption could be investigated, but in view of growing development assistance expenditures on drugs, particularly antiretrovirals, there is an urgent imperative to study the nature and quantity of leakages of prescription pharmaceuticals from the public sector, and the interests that allow this to continue.

A focused and targeted effort is needed to investigate governance structures for a variety of key health-sector

actors (providers, insurers, regulators) and different types of accountability (financial, performance, and democratic). In the near term, such studies may be focused particularly on decentralisation and public-private partnerships that are increasingly being used to extend service coverage.

Health information systems

The development of health-management information systems in poor countries has usually been heavily and often adversely influenced by the information needs of donor agencies and international vertical (single health-problem) programmes.[36] The result is that health-management information systems in low and middle income countries are severely underdeveloped, often with a haphazard collection of patchy information that is scattered throughout various programmes with limited, if any, feedback to those who collect the information. These information systems are riddled with inaccurate and inconsistent data, expensive to operate, and time consuming and demotivating for large numbers of health staff. Health-management information systems often fail to record data on inequalities in a rigorous manner, so that monitoring trends in inequalities is impossible. Research on the development and implementation of sustainable low-cost national health-management information systems and district-level minimum essential indicator sets, which are appropriate to the needs of poor countries,[37] are high priorities.

Priority setting and evidence-informed policy making

In cross-country comparisons, the impact of public spending on health has been found to be quite small, with a coefficient that is typically numerically small and statistically insignificant.[38] The poor often spend substantial sums of money on private services because public-sector resources are concentrated on services for richer population groups.[39] Without explicit consideration of priority setting, this situation is likely to remain unchanged: resource allocation is too often dictated by historical patterns, and maintains vested interests. Development and multicountry evaluation of a process to incorporate, explicitly and transparently, important equity concerns, non-health effects of health interventions, and other ethical issues into priority setting is needed. This assessment can highlight existing inequities, and at the same time show what tradeoffs exist between efficiency and equity and other societal concerns.

Decision-makers must have access to reliable and relevant research evidence to make well-informed decisions about health care. Generating, synthesising, making available, and improving the use of reliable and relevant health systems research for low-income countries presents major challenges and requires the development and use of appropriate methods.[40]

Effective approaches to intersectoral engagement in health

There are a range of policies and interventions in a number of sectors that could have far reaching effects on health. These include agriculture, education, transport, housing, social welfare and telecommunications policies. National transport policies may, for example, affect health through traffic injuries, air pollution, and transportation to health-care facilities.[41] Socioeconomic development activities for the poor such as micro-credit[42] or conditional cash transfers[43] may help prevent ill health and provide financial access to treatment. However, empirical work in low and middle income countries testing the impact of these and other development activities is limited. Access to adequate amounts of clean water and sanitation has major health benefits,[44] but evaluations of policies and actions for achieving this goal at low cost are lacking. It is uncertain how best to engage policy makers from other sectors in considering health outcomes. A better understanding of the incentives and disincentives that motivate their attitudes and decisions is needed.

Global influences

Global factors are increasingly impinging on national health policies and systems, for example through the General Agreement on Trade in Services (GATS) agreement that regulates trade in services, potentially including health services.[45,46] The policies of global institutions such as the World Bank, the International Monetary Fund, World Trade Organization, WHO, and the Global Fund for AIDS, TB and Malaria, affect the development and performance of health systems in many countries. Conditionalities laid down by large donors, such as the US Government's Millennium Challenge Account and UK Chancellor of the Exchequer's proposed International Finance Facility, could also affect health. This influence is exerted both as a result of the flows of financial resources and also because, in some cases, global institutions have a pivotal role in determining both disease priorities and policies for health systems. Additionally, certain policies, for example concerning trade, affect the determinants of health, which in turn affect the burdens on health systems. As such, the impact of global influences needs to be studied to provide the evidence to shape macroeconomic policies and trade relations. Donor priorities may compete and in some cases conflict with each other; therefore, evaluation is needed for mechanisms such as basket funds, sector wide approaches, and other approaches to coordinating donor activities. The absorptive capacity of countries to use donor resources effectively and to coordinate the inputs of multiple donor agencies may be a key limiting factor in developing functioning health systems.

Valid and transferable research

Rigorous health-systems research requires contributions from many disciplines including epidemiology, biostatistics, health economics, sociology, anthropology, and policy analysis. Both qualitative and quantitative research methods have important parts to play. In some circumstances, interventions can be assessed with randomised trials—particularly cluster trials, in which the unit of randomisation may be communities or health facilities—but such opportunities are often missed. However, many research questions cannot be addressed by randomised designs—for example, because they may be system-wide in their scope. Other approaches, such as interrupted time-series analyses, need to be considered, as well as process evaluations to understand better how and why interventions work or do not work as intended. Participatory action research has potential to elucidate both constraints to success of interventions, as well as improve performance of health staff.[47] Contextual factors are generally thought to be important effect modifiers, but are often poorly described by researchers, making it difficult to determine why a particular intervention or policy has been effective or ineffective. Better description of relevant contextual factors and greater reliance on multicentre or multicountry research, where a given research question can be addressed across a range of settings, is needed.[48] Recommendations for improved design of non-randomised studies have recently been published.[49] Collaborative research networks could, in addition to undertaking large-scale multisite health-systems research, play an important part in building research capacity and promoting use of research findings.

The role of systematic reviews in summarising the strength and relevance of the evidence and helping to set a research agenda is well established for evaluating clinical interventions but less so in health-systems research, in part because of the methodological challenges of synthesising evidence from different contexts using a range of methodological approaches. Although many of the systematic reviews undertaken by the Cochrane Effective Practice and Organisation of Care group address relevant questions about the effects of organisational and financial interventions and include studies using a variety of relevant designs, few are from low income countries.[27] Systematic reviews across all the areas outlined in table 1 are needed to inform decisions about actions and future research.

The research community and policymakers must interact more effectively if the findings of health-systems research are to have an effect. The challenge of improving the use of research will be covered in a subsequent article in *The Lancet*.[50]

Conclusions

We invite comments from *Lancet* readers on the research agenda outlined in this article (see panel 2). A revised document taking into account responses to the consultation and including the templates outlining research questions in each topic area will be submitted to WHO following the Mexico Summit on Health Research. It is hoped that the report will stimulate subsequent commitments of resources and international collaboration to address agreed priorities.

Only a decade exists before the target date for the MDGs in 2015. It is now a matter of urgency to ensure that health systems become the focus of national and international efforts to improve capacity to deliver effective interventions in an equitable fashion to those who can benefit. Health-systems research is essential to reduce our collective uncertainty about how to achieve the MDGs and to provide a basis for well-informed decisions and actions through which the findings of such research can be implemented.

Task Force members

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Conflict of interest statement

A Hyder is a consultant for WHO. A Mills is Chair of the Board of the Alliance for Health Policy and Systems Research, and is paid part time for this. The other authors declare no conflict of interest.

Acknowledgments

We are grateful to Tikki Pang and Ulysses Panisset of WHO for their guidance and support as well as their coordination of the processes of consultation, which was ably assisted by Patrick Unterlechner. Thanks are also due to Tim Evans, Assistant Director General of WHO, who set up the Task Force and contributed to its outputs. We thank all those who provided information about potential priority areas and commented on drafts of the paper, and will list these contributors in full at a later stage in the consultation. The views expressed in this article are those of the Task Force and are not the official policy of WHO.

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Making health systems more equitable

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Lancet 2004; 364: 1273–80

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Health systems are consistently inequitable, providing more and higher quality services to the well-off, who need them less, than to the poor, who are unable to obtain them. In the absence of a concerted effort to ensure that health systems reach disadvantaged groups more effectively, such inequities are likely to continue. Yet this situation need not be accepted as inevitable, for there are many promising measures that might be pursued: establishment of goals for improved coverage in the poor, rather than in entire populations, and use of those goals to direct planning toward the needs of the disadvantaged; use of one or more of the several techniques that seem to have been effective in at least some of the settings where they have been tried; and empowerment of poor clients to have a more central role in health system design and operation.

If access to health services were distributed according to need, the poor would come first. But they do not. Rather, the "inverse care law",[1] initially described in this journal more than 30 years ago, remains alive and well, and, as a result, "the availability of good medical care tends to vary inversely with the need for it in the population served".[1]

The greater health needs of the poor than of the rich have been amply documented over the years, through studies on health status differentials between disadvantaged and well-off population groups. Best known are the differences between poor and rich regions of the world—eg, the nearly 30-fold differences in under-5 mortality between Africa and Europe.[2] But important differences between well-off and disadvantaged groups also exist within countries: death rates are twice as high in black than in white working-age adults in the USA,[3] almost three-fold as high in unskilled workers as in professionals in the UK,[4] and nearly twice as high, on average, in infants and children in the lowest economic 20% than in the highest 20% of the population in the 56 developing countries covered by a recent review.[5]

Disparities with respect to access to health systems are in the opposite direction, with the well-off faring far better than the disadvantaged. Disparities in regions are indicated by per person health expenditure figures, which were well over 100-fold as high (US$2736 *vs* $21) in the 960 million people in the world's high-income countries than in the 2·5 billion living in low-income nations.[6] Within the developing countries that are of principal interest here, disparities are less pronounced, and they vary greatly from place to place and from sector to sector within the health system. However, these disparities are almost always regressive, or pro-rich. This fact can be seen from the information available about the public and private components of health systems, and about specific services that health systems deliver.

Public and private components of health systems

The growing attention paid to government services of developing countries over the past few years has produced a set of findings that indicate clearly that such services usually favour the better-off. The record of private services has not been nearly so well established, but they seem to be even more oriented toward higher-income groups.

The attention given to government services has focused especially on curative care provided through government facilities supported by general tax revenues. Performance in this part of the health system has attracted interest not only because of its size, but also because of the equity rationale often used to justify government involvement. As can be seen from table 1, rationale and reality usually diverge—ie, although governments may claim that they provide services to ensure that the poor are reached, their health service subsidies tend to provide considerably greater benefits to the well-off. The situations in 21 countries (or areas within countries) were covered in a 2003 review (Argentina; Armenia; Bangladesh; Bulgaria; Colombia; Costa Rica; Côte d'Ivoire; Ecuador; Ghana; Guinea; Honduras; India; Uttar Pradesh state, India; Indonesia; rural Kenya; Madagascar; Nicaragua; South Africa; Sri Lanka; Tanzania; and Vietnam).[7] The top 20% of the population gained on average over 26% of total financial subsidies provided through government health expenditures, compared with less than 16% in the lowest 20% of the population. Only four of these countries—all in Latin America—show a progressive pattern of subsidies through government-provided curative services. But in that region, government-provided services are usually accompanied by a large, highly regressive, government-sponsored social security system that provides services to formal sector employees and their families.

The record with respect to preventive services that are publicly supported is less clear. However, with the dominant role of government in immunisation programmes, the notable rich-poor differences with respect

	Percentage of total subsidy to		Number of countries or regions where subsidy to lowest 20% of population is		
	Lowest 20% of population	Highest 20% of population	Less than subsidy to highest 20%	Same as subsidy to highest 20%	More than subsidy to highest 20%
All health expenditures	15·9%	26·4%	15	2	4
Primary health care expenditures only	18·8%	19·7%	12	0	9

Source: Data for 21 developing or transitional countries, or regions within countries (reference 7).

Table 1: **Subsidies from government health services accruing to highest and lowest 20% of a country or region's population**

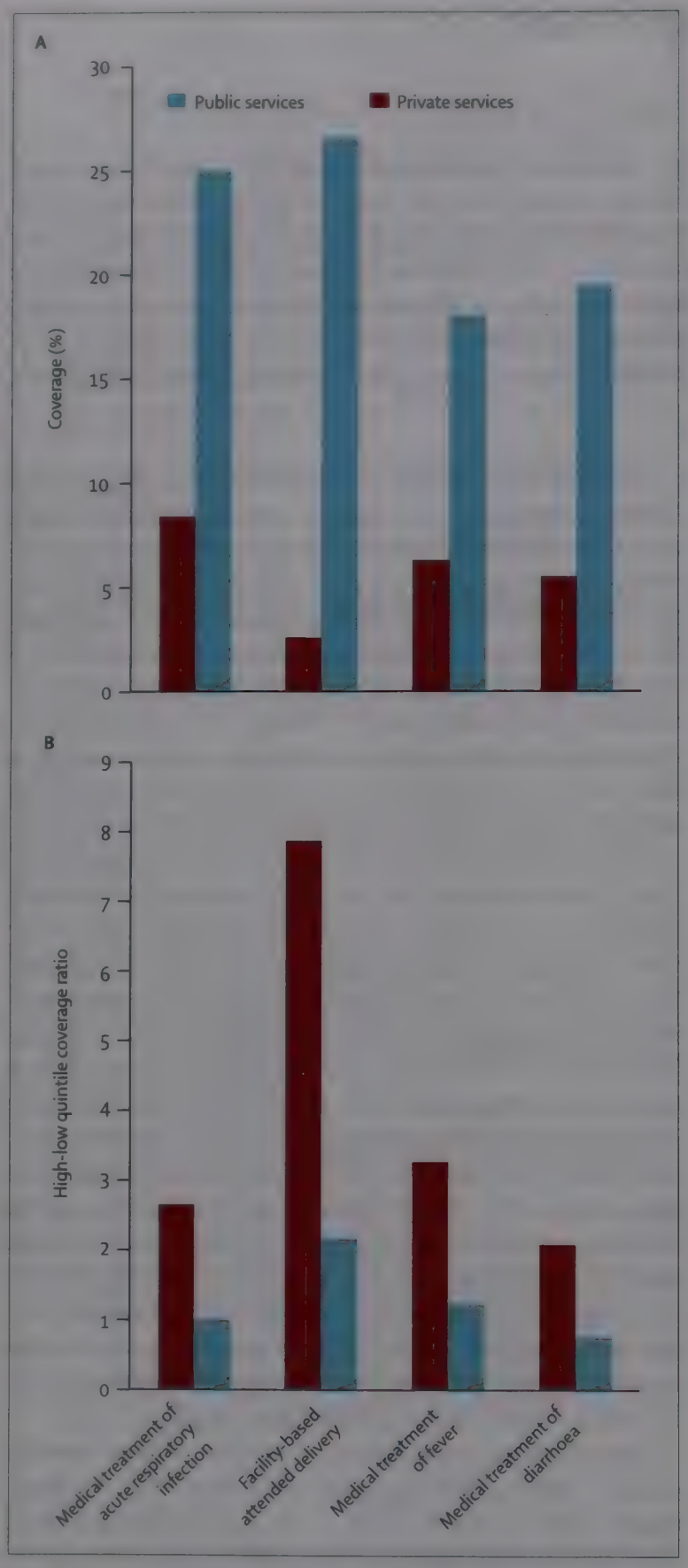

Figure 1: **Coverage of public and private health services in lowest wealth quintile in developing and transitional countries (A) and ratio of coverage levels between highest and lowest wealth quintiles (B)**
Vertical bars=unweighted averages for 51–56 countries, dependent on service. Source: reference 5.

to immunisation coverage, discussed below, suggest a regressive pattern in at least this component of prevention.

Information about the private component of country health systems is sparse, and such information that does exist deals mainly with specific services rather than with the record of the private component as a whole. This information points to considerably greater inequalities in private than in government services. Figure 1 shows data for four basic maternal and child health services in around 50 developing and transitional countries, separated by type of service provider. For each of the four services, private facilities or providers treat far fewer cases in the poorest segment of the population than do public facilities (figure 1 A). The most extreme example is facility-based deliveries: the few women in the poorest 20% of the population who deliver in medical establishments are about ten-fold more likely to use government than private facilities. Also, the distribution of people using private facilities or providers is heavily skewed toward the well-off (figure 1 B). For all four services, the ratio between the highest and lowest 20% of the population is over twice as high for private than for public providers.

However, these data refer to only the higher, possibly non-representative, part of what is a heterogeneous sector. Private services are provided not only through the advanced facilities or providers covered in figure 1, but also through other very different private sources such as traditional healers, pharmacies, and untrained village midwives. Although the quality of care supplied by such providers can be questioned, their clients might well be more concentrated in disadvantaged groups.

Further, the data in figure 1 do not distinguish between private profit-making entities and non-profit providers, and the latter are often much more concerned with reaching the poor than are profit-making entities. The non-governmental, not-for-profit sector is often assumed to be much more progressive than government services. This may well be the case, for at least part of the not-for-profit sector. Yet firm evidence is sparse, and there are many capital cities in the developing world with large, advanced medical facilities registered as non-profit institutions oriented mainly toward upper-class clienteles. In at least two countries, Tanzania and Zambia, this type of facility seems prominent enough to make the overall coverage pattern of non-governmental facilities (ignoring possible differentials in the fees charged to the well-off and the poor) notably more regressive than that of the country's governmental services.[8,9] How typical this is cannot be established without a more careful and systematic look at non-governmental services, which have hitherto been largely exempt from the careful scrutiny given to governmental services through studies like those in table 1.

Specific services delivered through health systems

Maternal and child health services, for which the most detailed information is available, are usually regressive. This also seems to be the case for most chronic disease programmes. Primary care, although regressive in most countries, generally seems less so than higher-level services.

The most complete set of information about the use of maternal and child health services is summarised in figure 2. The data presented show the coverage rates, from public and private programmes together, for six of these services in about 50 countries in Africa, Asia, eastern Europe, and Latin America. All are basic services directed toward issues of importance for the poor, and that thus typically feature prominently in health programmes intended for disadvantaged population groups. Yet all are regressive, with fuller coverage in the best-off than in the poorest 20% of the population. (Sex differences are less obvious. Coverage rates for boys and girls in most regions are within two to three percentage points of one another, with rates in boys being usually, but not always, higher than in girls.)

Only patchy information exists about coverage rates attained by programmes directed against diseases in adults; however, that information suggests, or at least hints, that the pattern for those programmes is similar to that of the maternal and child health initiatives just described. For instance, men and women in the poorest 20% of the population in about 15 developing/transition countries with available data are on average only around a third as likely to have received counselling or testing for HIV/AIDS as men or women in the population's best-off 20%.[5] Results from studies of five adult health programmes in Pelotas, Brazil, showed that three (Pap smear, mammography, and breast examination by a doctor) were highly regressive, one (influenza immunisation for people aged over 60 years) reached people in all socioeconomic groups about equally, and coverage of a fifth (diabetes screening) was higher in middle groups than in either high or low ones.[10] Findings from a study in South Africa showed that people in the highest socioeconomic 30% of the population with hypertension were more than twice as likely to have received the treatment needed to control this condition than people in the lowest 40% (although the rate of control was very low in even the highest group).[11]

Whatever the type of disease concerned, all levels of care—primary and secondary and higher—are usually regressive. However, poor–rich differences seem much larger for higher-level than for primary care. At least, such is the case with respect to the government services covered in table 1. In the 21 countries/areas described, the top 20% of the population received on average only a marginally higher share of benefits from primary care expenditures (20% *vs* 19%), whereas, as noted earlier, the share of benefit from total expenditures was notably greater in the highest than in the lowest 20% of the population (26% *vs* 16% of benefits). This finding implies that the distribution of health care expenditures on services other than primary care—mostly higher-level services—would be even more skewed toward the best-off than total expenditures.

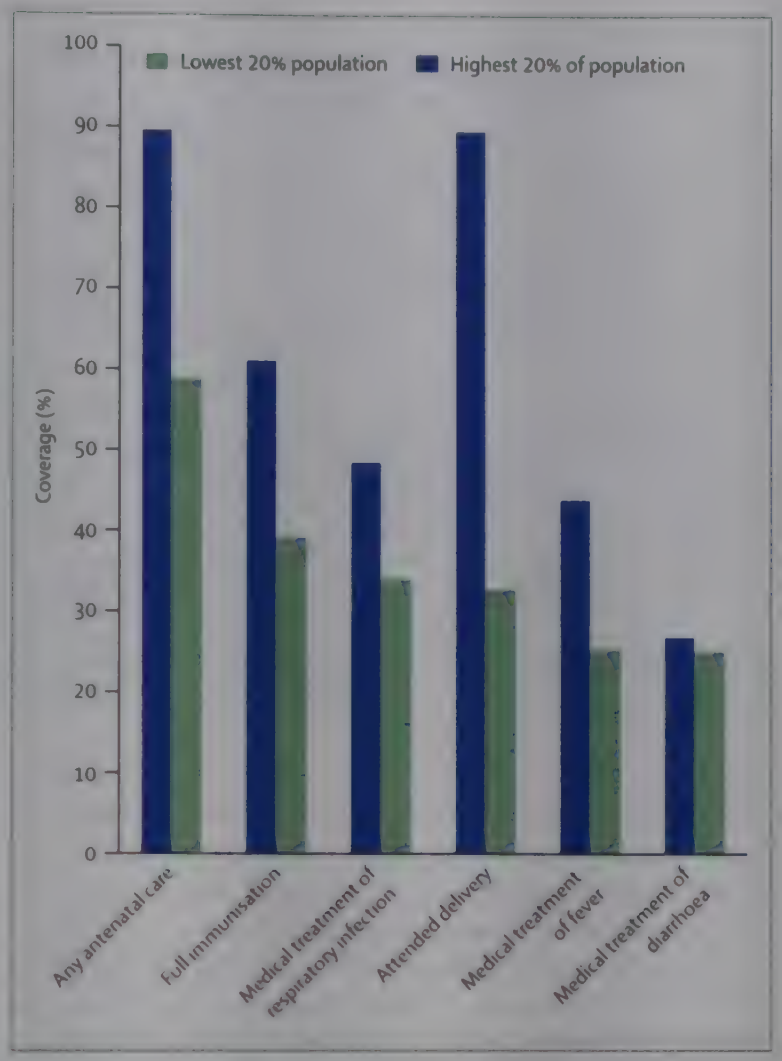

Figure 2: **Use of health services by lowest and highest wealth quintiles in developing and transitional countries**
Vertical bars=unweighted averages for 51–56 countries, dependent on service.
Source: reference 5.

The nature of the challenge

Judged by the standard definition of health service equity, which suggests that access to services should correspond to the need for them, the situation just described is clearly inequitable. So inequitable, some might plausibly argue, that drastic measures are called for to redistribute existing health services to right the imbalance—perhaps by closing down government hospitals in high-income urban areas and applying the recurrent cost savings to the distribution of free basic pharmaceuticals in poor rural communities. Valid as such an argument might sound in principle, however, its viability is questionable, since few politicians seem likely to risk anything so extreme. A less radical, but still ambitious approach would be to focus more on changing the future than the present, in order to ensure that most of any increment in health services flows to the poor, thereby producing a shift over time in a more equitable direction.

The nature and magnitude of the challenge that this approach means can be seen by looking at how much the poor might benefit from an expansion in one particular type of service widely thought essential for the poor, which is deliveries assisted by a suitably trained medical attendant.

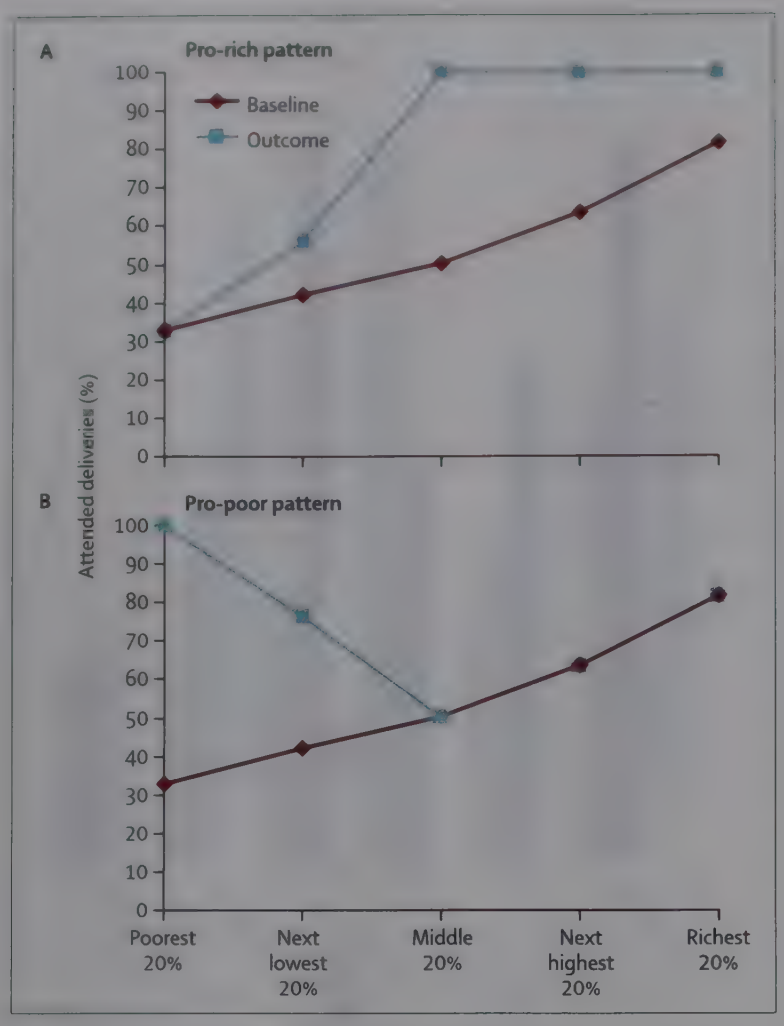

Figure 3: **Possible outcomes of increasing overall population coverage of attended deliveries from 52% to 75%.**
A, pro-rich pattern; B, pro-poor pattern.

In the late 1990s, around 52% of deliveries in the 56 countries covered by the data presented in figure 2 were attended by a doctor, a nurse, or a nurse-midwife. How much would the poor benefit from increasing this average rate of coverage to by approximately one-half, to, say, 75%?

The range of possibilities is presented in figure 2 A and B. In each figure, the baseline is the distribution of coverage as it existed when the overall population average stood at 52%. At that time, coverage varied from 33% in the poorest 20% of the population to 82% in the best-off 20% of the population. The outcome shown in each figure refers to the coverage rate that would exist in each 20% of the population on attainment of 75% coverage in the population as a whole, assuming no decline in any population subgroup.

Figure 3 A shows the outcome produced by the most regressive possibility, under which all additional services go first to the highest 20% of the population until 100% coverage is attained there, then to the next-highest 20% of the population until it is fully covered, and so on. Figure 3 B illustrates the outcome resulting from the most progressive feasible scenario, produced by reversing the procedure just described and starting with deliveries in the poorest women. The very different outcomes show how the same overall change may have very different equity implications. Under the outcome shown in figure 3 A, the increment in services would be adequate to provide full coverage to the top 60% of the population, with less than 15% of the total being left over for the population's poorest 40% and none at all for the poorest 20%. In figure 3 B, on the other hand, nearly 70% of the service increase would accrue to the poorest 20% of the population, with 100% going to the poorest 40% of the population.

The range of possibilities is very broad, and the poorest 40% of a typical developing or middle-income country's population could receive as little as 10–15%, or as much as 100%, of the benefit from an increase of about 50% in the total number of attended deliveries. Although one cannot know beforehand just where in this range the actual outcome might fall, history suggests that, in the absence of special efforts to reach the disadvantaged, a less extreme version of the regressive outcome outlined above is at least as likely as anything resembling the alternative, progressive outcome presented there. In view of the power of the inverse care law as shown in figure 1 and table 1, a more probable result is some variation of the pattern found in Latin America, where ". . . new public-health interventions and programmes reach those of higher socioeconomic status and only later affect the poor . . . inequities only improve later when the rich have achieved minimum achievable levels for morbidity and mortality, and the poor gain greater access to the interventions."[12]

If this were the case, the poor would begin receiving most benefits from any health service expansion only in the final stages of progress toward universal coverage—probably well after the target of a 75% overall average coverage rate is achieved. Universal coverage cannot be fully achieved without including the poor, and in that important sense, universal coverage constitutes an inherently egalitarian goal. But in assessing its suitability as an equity objective, at least two questions arise.

First, what is the likelihood of achieving universal coverage? Until now, this goal has seldom been approached, let alone reached in any but the best-off developing or transitional countries, despite such vigorous initiatives as the WHO Health for All movement and the UNICEF Child Survival Revolution of the 1980s and 1990s. Most global health service initiatives carefully stop short of promising universal coverage, at least any time soon. So it is at best an open question whether any moves toward universal coverage will, in the foreseeable future, reach a point at which most benefits will begin flowing to the poor. At least equally plausible is initially rapid progress that dies out before that point is reached, leaving even larger disparities than exist at present.

Second, why, even if the goal of universal coverage can be eventually approached, should the poor have to wait and be the last to benefit from progress toward this aim? It is difficult to see why the timing, in addition to the magnitude of the gains given to different social and economic groups should not be regarded as a substantial dimension of equitable health systems development.

	Current objective	Reformulated, poverty-relevant objective
Bangladesh—measles immunisation	Raise coverage in children in entire population: • To: 85% in 2004–05 • From: 65% in 2002	Raise coverage in children in the 50% of population below national poverty line: • To: 85% in 2004–05 • From: 60% in 1999–2000
Bolivia—treatment of infant pneumonia	Raise coverage in infants with pneumonia in the entire population who receive treatment in health services: • To: 23% in 2006 • From: 17% in 2000	Raise coverage in infants with pneumonia in the 62% of population below national poverty line: • To: 23% in 2006 • From: 15% in 1998
Tanzania—attended deliveries	Raise coverage in women in entire population: • To: 80% in 2010 • From: 50% in 2000	Raise coverage in women in the 48% of population below national poverty line: • To: 80% in 2010 • From: 37% in 1999

Left-hand column contains objective as currently stated for each health service indicated, and right-hand column provides an illustrative revised objective, constructed by applying the national target level for the service concerned to portion of population living below poverty line of country in question. Sources of information about current objectives: Ministry of Health and Family Welfare. Health, nutrition and population sector programme, July 2003–06. Dhaka: Ministry of Health and Family Welfare, Government of Bangladesh, 2003. Government of Bolivia. Estrategia Boliviana de reduccion de la pobreza. La Paz: Government of Bolivia, 2001. Government of Tanzania. Poverty reduction strategy paper. Dar es Salaam: Government of Tanzania, 2000. Sources of information about national poverty lines in reformulated, poverty-relevant objective: Ministry of Finance, Economic Relations Division. A national strategy for economic growth, and social development. Dhaka: Ministry of Finance, Government of Bangladesh, 2003. Government of Bolivia. Estrategia Boliviana de reduccion de la pobreza. La Paz: Government of Bolivia, 2001. Government of Tanzania. Poverty reduction strategy paper. Dar es Salaam: Government of Tanzania, 2000. Approximations of baseline coverage and years calculated from Demographic and Health Survey data as presented in reference 5.

Table 2: **Illustrative health service goals in national health and development plans**

Ways to meet the challenge

If one accepts the proposition that it will be a substantial challenge to ensure that the poor receive the highest possible proportion of increased services made available through progress toward national health development objectives, what can be done to meet the challenge? Thus far, this question has been asked so infrequently that there is no complete or fully satisfying answer. However, several initial steps can be suggested that, if not entirely proven, are at least plausible on the basis of such evidence as exists. Some, such as improved health financing, will be covered in later articles in this series. But there are three other steps that also deserve careful attention. One is to establish national health system objectives that are more relevant to conditions in the poor than the objectives currently in use, and to develop plans and monitor progress in terms of those modified objectives. The second is to apply the lessons learned from the promising experiences of several innovative efforts to reach the poor more effectively than through the traditional approaches discussed above. The third is to empower poor potential clients of health systems to play a more central role in the design and operation of systems.

Health system objectives

Typically, such health system output objectives as exist have been stated in terms of raising population average coverage rates. Since overall coverage can be raised through coverage increases in any subgroup of the population, whether well-off or poor, progress toward an increased average does not necessarily mean that the poor are benefiting substantially. In fact, as illustrated in figure 3 with respect to an increase in average attended delivery coverage, the better-off could well be the principal beneficiaries of rises in average coverage rates.

An obvious way to start orienting health systems toward the poor is to establish objectives of which the achievement necessitates the poor benefiting fully from the services provided, and to monitor progress in terms of those goals. For example, targets could be set in terms of progress, not in all people in the population, but in those people within the population who live in poverty.

This is the approach that has been followed in setting economic development goals, which are now rarely stated in terms of national average per head income growth, the measure that was previously predominant. Rather, the standard approach has become to express goals in terms of reductions in the percentage of the population below some specified poverty line. The first of the eight well-known UN Millennium Development Goals, for example, is to reduce by 50% the number of people with per head consumption of less than a dollar per day. Many national governments have adopted the same approach: for instance, the objective of Bangladesh's poverty reduction plan is to lower the proportion of the population below its national poverty line from 50% to 25% by 2015,[13] Bolivia aims to reduce the percentage of the population living in poverty from 62% to 41% between 1999 and 2015,[14] and Tanzania's goal is a 50% reduction by 2010 in the proportion of its population that is poor.[15]

Table 2 shows what such an approach might look like when extended to health services in these three countries. With the approach taken in table 2, or any of the many possible variants of it, goals would be established in terms of progress accomplished in the poor alone. Any gains in the well-off would be judged collateral benefits that would not count in assessing progress.

An objective expressed in terms of coverage in a specific economic group would not provide clear and immediate operational guidance, in view of the difficulty of identifying and serving poor people or groups. It might also heighten the challenge of monitoring progress of at least some health system goals. But both these obstacles have been largely overcome in overall economic devel-

opment, in which the measurement challenges are arguably far greater than in health service development. Figures about rates and trends in the percentage of a country's population below the poverty line have become routinely featured in reports on economic progress,[16] and, more importantly, have helped to shift the focus of policy makers from promoting overall growth toward finding ways of improving conditions in the disadvantaged.

Applications of lessons learned

Important as revised objectives and monitoring might be for focusing attention, revising them does not in itself change the proportion of service programme benefits that accrue to the poor. A change in the distribution of benefits, which is what counts, needs modified service delivery approaches.

Efforts to find modified approaches have begun to accelerate, and these have produced growing numbers of instances where services delivered through health and other systems are considerably more pro-poor than the more traditional services described in table 1 and figure 2.

A global conference on reaching the poor with effective health, nutrition, and population services featured presentation of 36 case studies covering well over 100 programmes assessed from the perspective of how their benefits had been distributed across economic classes within the countries concerned.[17] The case study experience indicated that it is feasible to monitor the distribution as well as the overall magnitude of programme benefits, through simple modifications in existing evaluation techniques, and the study findings pointed toward several promising approaches for reaching the poor more effectively than in the past.

Figure 4 shows the record of an illustrative sample of the studies presented.[17] The record can be assessed from two perspectives. One is with respect to the proportion of a programme's benefits that are gained by the poor, defined in figure 4 as the population's poorest 20%. (This is often referred to as the programme's benefit-incidence or focus.) As shown on figure 4's horizontal axis, the poorest 20% of the population received over 20% of the benefits provided by 18 of the 27 programmes covered, making those programmes pro-poor. In the case of seven of the programmes, the poorest 20% of the population gained more than 40% of the benefits. The other perspective concerns the programme's coverage in the poor. This is measured on figure 4's vertical axis. 14 of the 27 programmes covered or served over half the population's poorest 20%.[17]

Mexico's Progresa cash transfer programme, which pays rather than charges poor families for clinic and school attendance, serves 20 million people, and provides 20% of the income to participating families. Almost 60% of the people reached belong to the poorest 20% of the country's population; 80% of beneficiaries are in the poorest 40%. Colombia's use of a refined individual targeting technique to provide subsidised health insurance to the disadvantaged raised insurance coverage in the poorest quintile of the population from well under 10% in the early 1990s to nearly 50% 4 years later. 35% of the total programme subsidy went to the poorest 20% of the population; 65% to the poorest 40%. Cambodia experimented with contracting with non-governmental organisations to operate governmental rural primary health services, under contracts that called for attainment of specified coverage levels in the poor. During a 4-year experiment, the coverage in the poorest 20% of the population of eight basic services rose from an average of less than 15% to over 40% in two experimental districts with a total population of about 200 000. This increase was nearly 2·5-fold as large as that experienced in two control districts that continued to receive standard government services. Distribution of insecticide-treated bednets was through measles immunisation campaigns in Ghana and Zambia, and through social marketing in Tanzania. In Ghana, the Red Cross and the government's health service raised, from 3% to nearly 60%, the rate of treated bednet use in children in the poorest 20% of people in a northern district with a population of about 90 000. A similar programme in Zambia produced comparable results: an increase in insecticide-treated bednet coverage from 18% to 82% in the poorest 20% of the population in five rural districts with a total population of 450 000. In Tanzania, the Ifakara Health Research and Development Centre developed and implemented a social marketing programme in two southern districts with a total population of about 60 000, which over 5 years raised the ownership of bednets in the poorest 20% of households from 20% to 73%. In all these three cases, the increase in bednet use/ownership was higher in the poor than in the well-off.

Experiences that seem to have reached the poor effectively have varied greatly in scope and approach. For instance, in the programmes described here, some (Ghana, Tanzania, and Zambia) were small experiments with initiatives against specific diseases, whereas others (Mexico and Colombia) represented country-wide reforms that touched on many fundamental aspects of national health systems. Some programmes (Cambodia, Ghana, Tanzania, and Zambia) featured a change in service delivery organisation or strategy or both, whereas others (Colombia and Mexico) focused on modifying the way services are financed. Although some (Ghana and Zambia) focused only on communicable diseases in children, several others (Cambodia, Colombia, and Mexico) were much broader, dealing also with adults and chronic diseases.

The range of techniques featured in the apparently successful projects and programmes was wide. Among the techniques were: improved means of identifying poor individuals (Colombia and Mexico), cash payments for use of services (ie, negative user fees, referred to as

conditional cash transfers, in Mexico), services provided by non-governmental organisations working under contracts with carefully specified pro-poor performance indicators (Cambodia), mass campaigns (Ghana and Zambia), and social marketing (Tanzania).

These data are being examined to identify whether successful programmes like those just cited share common features that cut through this apparent diversity and provide straightforward, clear guidelines about what does and does not work. Whatever the outcome of these examinations, experiences such as those mentioned earlier at the very least point clearly to the existence of many approaches that, when implemented by dedicated and competent policy makers, have the potential to bring about substantial improvements in how well health systems reach and serve disadvantaged groups.

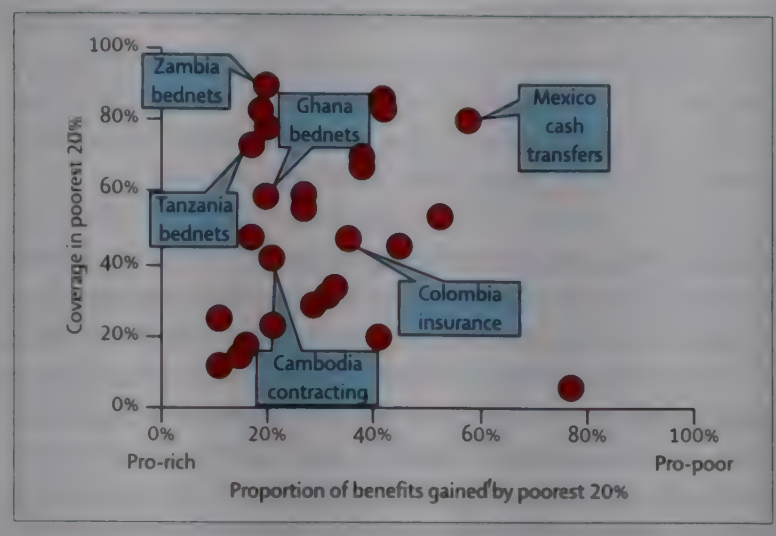

Figure 4: **Record of modified approaches in reaching the poor**
Source: reference 17.

Empowering poor clients

Most if not all of the experiences described above were mainly supply-driven—eg, designed and initiated mainly by those who operate health systems and supply health services. An alternative, complementary approach is to focus on creating an effective demand and pressure for relevant health services on the part of the poor, to counterbalance the influence of well-off groups that traditionally define priorities and design programmes.

A prominent illustration of the empowerment approach is the People's Charter for Health of the People's Health Movement,[18] a global coalition of grassroots organizations. The charter begins by stating "Health is a social, economic and political issue and above all a fundamental human right . . . . This Charter builds on perspectives of people whose voices have rarely been heard before, if at all. It encourages people to develop their own solutions and to hold accountable local authorities, national governments, international organizations and corporations."[18] The charter then goes on to list about 60 recommendations, ranging from scope from advocacy of universal, comprehensive primary health care and the central participation of people's organisation in health programmes, to support for campaigns for peace and disarmament.[18]

Substantial elements of this approach have also begun to work their way into the thinking of institutions often believed to have a very different overall orientation. An example is the World Bank, whose *2000/2001 World Development Report: Attacking poverty* put forward empowerment of poor people as one of the three core areas for action in its framework for poverty reduction.[19] This report was followed even more forcefully by the bank's *2004 World Development Report: Making services work for poor people*, which emphasised the importance of enabling poor people to hold service providers accountable, both directly and indirectly through influence on policy makers.[20]

Thus, the importance of empowering the poor has been gaining acceptance in a wide range of professional groups and institutions. There is thus far little empirical evidence solid enough to satisfy a serious epidemiologist that the empowerment approach can work; that it is feasible to empower an adequate number of poor clients to the point where they can bring about a substantial improvement in how health systems operate. But although further such evidence is clearly needed, its dearth cannot be equated with the presence of evidence proving that empowerment of poor clients is not feasible. Firm evidence casting doubt on empowerment's potential effectiveness is even scarcer than that in its support.

Conclusion

In brief, health systems are consistently inequitable, providing more and higher quality services to the well-off who need them less than the poor who are unable to obtain them. In the absence of a concerted effort to ensure that health systems reach disadvantaged groups more effectively, such inequities are likely to continue. Yet these inequities need not be accepted as inevitable, for there are many promising measures that can be pursued: establishing goals for improved coverage in the poor, rather than in entire populations, and use of those goals to direct planning toward the needs of the disadvantaged; use of one or more of the several techniques that seem to have been effective in at least some of the settings where they have been tried; and empowering poor clients to have a more central role in health system design and operation. Through the application of these and other measures, it is quite feasible to give equity considerations the central place that they deserve in the plans and policies for health and related sectors.

Admittedly, the menu of options is long, and many remain to be fully tested. Further, there is no guarantee that any one of those options will work well in settings other than those in which it has been already tried. Health policy makers will wish to experiment with a wide range of possibilities, monitor progress carefully to see how well they work, and retain those that prove effective, while replacing those that do not. Although one

cannot be completely certain that this process will produce substantial improvements for service coverage in the poor, it is far more promising than the continuation of present approaches, which have been clearly shown to produce notably inequitable coverage patterns.

Even less certain is whether the process would in the end lead to more or less efficient health systems, in the sense of heightening or reducing the improvement in a society's overall disease burden brought about per unit of resources invested. On the one hand, reaching the poor might prove difficult and thus expensive, in which case diverting resources from more cost-effective programmes to initiatives seeking to reach the poor could reduce overall efficiency. But the case is far from clear-cut, since there are important countervailing considerations. One is the much higher prevalence of ill health in disadvantaged population groups: even if poor people should prove more expensive to serve than those who are well-off, higher prevalence of treatable disease in the poor could result in an increased overall health benefit from programmes that serve them, thereby resulting in increased efficiency. Also, there are many components of current health systems whose efficiency is open to serious question—the oft-cited case of curative services for terminally ill patients in higher-level institutions, for example. Diversion of resources from expensive activities like these toward far less costly ones like outreach programmes in poor villages would seem at least as likely to produce gains as losses in overall health system efficiency.

However, firm evidence one way or the other is largely absent. So it would not be legitimate either to advocate or to oppose reorienting health systems toward the needs of the poor on efficiency grounds. But suppose it turns out that there is in fact a tradeoff between equity and efficiency in health system design. Who is to say that efficiency considerations should necessarily prevail? Equity in coverage is obviously by no means the only objective that health systems should seek to achieve, but what is the basis for regarding equity as any less important than efficiency?

Contributors

All authors have actively participated in the development of this article, which was drafted by D R Gwatkin on the basis of extensive inputs from and discussions with A Bhuiya and C G Victora.

Conflict of interest statement

Davidson R Gwatkin is a former employee of the World Bank. At the time of preparing this paper, he was a part-time consultant to the Bank and to the Rockefeller Foundation. However, his work on the paper received no financial support or substantive input from either institution; nor were the paper's contents subject to either institution's review and approval procedure. Neither Abbas Bhuiya nor Cesar Victora currently has any institutional affiliation that could potentially represent a conflict of interest with respect to the material presented.

Acknowledgments

The authors acknowledge the important contribution to their thinking made by the Feb 18–20, 2004 Reaching the Poor Conference organised by the World Bank, in collaboration with the Gates Foundation and the governments of the Netherlands and Sweden.

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Health financing to promote access in low income settings—how much do we know?

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Lancet 2004; 364: 1365–70

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In this article we outline research since 1995 on the impact of various financing strategies on access to health services or health outcomes in low income countries. The limited evidence available suggests, in general, that user fees deterred utilisation. Prepayment or insurance schemes offered potential for improving access, but are very limited in scope. Conditional cash payments showed promise for improving uptake of interventions, but could also create a perverse incentive. The largely African origin of the reports of user fees, and the evidence from Latin America on conditional cash transfers, demonstrate the importance of the context in which studies are done. There is a need for improved quality of research in this area. Larger scale, upfront funding for evaluation of health financing initiatives is necessary to ensure an evidence base that corresponds to the importance of this issue for achieving development goals.

Introduction

Adequate, well managed financing of the public health system continues to elude most countries. The difficulty is especially severe in low income countries, in which health systems struggle with meagre and inequitably distributed resources. Additionally, access to services for the most disadvantaged is usually very poor, further reducing the benefit of already scarce resources for those most in need.[1,2]

The WHO Commission on Macroeconomics and Health made a case for more investment in health by both donor nations and low income country governments to attain the average of $34 per head expenditure needed to make basic health care available.[3] The governments of many low income countries are challenged to raise their share of this sum in an efficient, sustainable, and politically acceptable way. In the meantime, many of the poorest people in the world already pay for private services. In 1999, the World Bank estimated that government health expenditure in Cambodia was $2 per head and out-of-pocket spending was over $33.[4] Often, a major component of the private sector is services provided by cash-strapped public sector employees, with some combination of public sector financed drugs, facilities, and time. Health financing, both in terms of raising resources and of ways to manage those resources, is the cornerstone of strategies to address these difficulties. Evidence of what works, and how governments can generate and manage finances in a sustainable and equitable way, is vital. The need for greater evaluation of the distributional impact of policies and programmes has also been emphasised.[5]

Methods for gathering evidence have developed rapidly in disciplines such as clinical practice. In particular, systematic reviews of intervention trials are being undertaken to provide an overview of existing research and reduce bias in the reporting and interpretation of results. Methods of synthesis are less developed for topics related to health systems. The Cochrane Collaboration, through its Effective Practice and Organisation of Care (EPOC) group, is seeking to extend systematic reviews to a range of topics relevant to the organisation and delivery of care.[6,7] In view of the difficulties of applying randomised controlled trial methods to all such topics, the group includes some non-randomised designs such as interrupted time series and controlled before and after studies.

Success or otherwise of different health financing strategies can be measured along several dimensions, such as effect on provider and user behaviour, overall consequences for revenue generation and efficiency, and effect on equity of access and on health outcomes. Health financing can also be studied from a number of disciplinary perspectives. With our main focus on studies with a similar approach to the Cochrane Collaboration's EPOC, we outline research that has been undertaken on the impact of various financing strategies on health systems access, utilisation, or health outcomes in low income and middle income countries. We focus on study design and approach, to give a sense of the nature of evidence that exists and its strengths and weaknesses, as well as discussing the implications for policy. Existing studies present a broad array of research approaches, from the highly quantitative to the highly qualitative. Recognising this variety, as well as the value of reviewing evidence more systematically, we have tried to step across the traditional divide between clinically oriented ways of

Search strategy

For this article, we did not do a systematic review, but we attempted to do as broad a search as time allowed. We searched PubMed, Web of Science (Science Citation Index and Social Science Citation Index), BIDS IBSS, ELDIS, HEED, ID21, and a number of grey literature databases. We limited our search to articles in English published since 1995. Keywords and MeSH terms included "econom*", "financ*", "health care", "access", "socio-economic factors" and "delivery of health care" "health care reform", "health services accessibility", "health care rationing", "health care costs", "health resources", "health services needs and demand" "health care surveys" "health expenditures". Editorials and letters were excluded from the searches and the search was limited to research from developing countries and regions consisting of such countries (Africa, Asia, and Latin America). Additionally, the references of key articles and documents were examined. Grey literature known to the authors or that was identified during the period of the search was also reviewed.

Panel: Overview of study types

Policy review
Policy reviews or critiques, which reviewed findings of other studies or policy options, or described and critiqued policies in different settings.

Descriptive case study
Descriptions of programme design and implementation or assessments of programmes, which may be small-scale. They may contain quantitative or qualitative data on some aspects of implementation or effect.

Cross sectional
Studies that compared different areas with and without interventions, but had no baseline and could not allow for systematic differences between the areas.

Before and after
Provided data on effect of an intervention starting before and continuing after its introduction, but with no clear point in time at which one intervention occurred—therefore not fully conforming to the interrupted time series definition below.

*Interrupted time series**
Provided at least three data points from before and three from after an intervention, and a clear indication of when the intervention took place. The intervention effect can be measured against the pre-intervention trend.

*Controlled before and after**
Included data before and after the effect of an intervention, and incorporated a control group, but the selection of the intervention and control areas was not random.

*Randomised and quasi-random cluster controlled trials**
An attempt is made to reduce systematic differences between intervention and control groups by using some form of randomisation or quasi-random allocation criteria for intervention and control groups.

*Acceptable for inclusion in an EPOC review.

assessing research evidence and those more recognised in the social sciences. The large body of case studies that fall outside of the EPOC criteria is also briefly described and their strengths and weaknesses are discussed.

Definitions

Subject matter and methods of the papers identified were reviewed during a screen of titles and abstracts. For subject matter, we defined interventions of interest as those that encompassed different approaches to raising financial resources and/or disbursing them, where a main objective was to improve access to health services. Improving access can be achieved either by (1) reducing barriers to uptake of existing services, (2) increasing demand for existing services, by boosting quality or providing incentives for uptake or (3) extending service coverage to previously underserved areas. Our focus would ideally be limited to evidence of greater uptake of necessary interventions by poor or vulnerable groups. However, in view of the absence of data, we include studies that provide data on overall changes in use.

Cost recovery strategies, which might be expected to limit access by introducing a financial barrier, have been included because they are frequently justified on the grounds that they might improve access for poor groups by generating resources with which to improve the quantity and quality of services, and, or, ending informal charging. Contracting services to private providers in underserved areas, and conditional cash transfers (dependent on the uptake of certain health services), are included in this review as policy initiatives to extend or increase public sector service uptake. We excluded topics such as use of the private sector, and decentralisation and resource allocation, as these were seen as broader than financing interventions per se.

We looked for studies that had used methods that approximated to the EPOC criteria. This meant that we focused on papers that presented at least primary data on the impact of a specific financing intervention on utilisation, or a comparison of the impact of two or more interventions, and data over time. Ideally the studies would also include data from before and after the intervention and data from a control group

An overview of classifications of study type that emerged, reflecting a combination of the EPOC criteria and the nature of the papers that we found, is shown in Table 1. Very few studies fell into the categories that we sought. The vast majority of papers were either case studies or policy reviews. Those that came closest to our study designs of interest are briefly reviewed for the major topic headings of user fees, community-based prepayment or insurance schemes, national health insurance, contracting out, and conditional cash transfers.

User fees

Many of the better known empirical studies and reviews of the effect of user fees were reported before 1995.[8–11] From 1995 onwards, we noted several studies from Africa, presenting usage data before and after the introduction or removal of user fees. None included data from a control group and most did not fully conform to the EPOC group's definition of interrupted time series. Kenya's introduction of outpatient fees in the early 1990s provided a good opportunity for assessment of their effect.[12–14] One article provides use and revenue data from six national indicator districts for 1989–93, during which fees were implemented, suspended, and subsequently re-introduced.[12] Two more studies present data that are more localised geographically and monitor trends for about 2 years.[13,14] Zambia's health sector reform in the 1990s included the introduction of charging, and attendance and admissions data for hospitals and health centres in 21 of 67 districts have been analysed for 1993–97.[15] Tracking the exempted services of measles vaccination and deliveries, the researchers commented on trends in services subject to charges, and underlying trends in service uptake that might have been caused by changes in quality and supply as a result of the broader health sector reform process. In Zaire, use was tracked in one health district for 60 months during which user fees rose strikingly and attendance fell.[16] Alternative explanations for the fall in attendance such as quality issues were

considered. In Uganda, before and after data for 25 months show the effect of community introduced cost-sharing on use at 11 health units in one district.[17] Fees were retained at the facility and used to make substantial incentive payments to staff. All facilities in the district had introduced fees, so a subsample of clinics was chosen to attempt to control for confounding factors such as staff transfers, drug shortages, and disease outbreaks. Finally, a small scale study in South Africa looked at uptake of curative, antenatal, immunisation, and growth monitoring services at one mobile clinic over the period 1992–98, during which user fees were withdrawn. Here, some confounding variables were discussed but the study design did not allow them to be controlled for.[18]

In all studies, an overall fall in use accompanied the introduction of charging (or vice versa in South Africa),[12–18] although in Uganda some rural facilities saw a rise in uptake.[17] What this finding implied for efficiency and equity of service delivery overall was less clear. Data about who changed their use and for what type of service were usually not presented. Fees were often accompanied by the introduction of measures to improve service quality, or changes in the services available, and it is difficult to separate the effects of the two. Implementation issues that were emphasised included the importance of appropriate and effective exemption mechanisms,[12,14,15] high levels of community involvement and incentive payments to staff,[17] and the possibility that when user fees were removed, increased attendance for curative services might impede adequate preventive attendance.[18]

Community-based insurance or prepayment schemes

For micro insurance and community prepayment schemes, we drew on a review by the International Labour Organisation[19] on the effectiveness of community-based health organisations as a mechanism for social protection. The review included information on 258 cases from 127 documents, either grey literature (publications issued by academic, business, government, and industry that are not controlled by commercial publishing interests) or peer-reviewed reports. The review criticised an overconcentration on issues of enrollment and the financial health of schemes, and the failure to address the question of whether enrollment in a scheme brought positive benefits to enrolled individuals and communities overall. Additionally, few schemes had been followed up over time, and no assessments looked at schemes that had failed. The small size of schemes was noted: 50% of those reviewed had fewer than 500 members. Key difficulties that affected the internal validity of the studies were identified as an absence of baseline data, absence of control groups, difficulties in sampling, absence of control for confounding variables, and weak sources of data. Other recent reviews, one a systematic review of voluntary, not-for-profit, community-based health insurance, have emphasised similar problems.[20,21]

Comparison of alternative cost-recovery schemes

A few reports compared uptake with user fees with that under a more pooled system of prepayment. A controlled before and after design was used in Niger to compare the effect on use of different payment methods.[22,23] Three similar districts were included: in one, user fees were instituted, in the second, a form of social financing was introduced (a local annual tax for district taxpayers plus a smaller user fee), and the third was a control district in which no changes were implemented. Quality improvements were instituted in intervention districts but not the control district. Use stayed at the same rate in the control district over the study period while both intervention districts recorded a rise in use, as a net effect of the combination of charges and quality improvements. Use rose more in the district with a tax and a smaller fee, especially among those living close to the facilities. This investigation recorded changes in use by socioeconomic group, and showed significant increases in uptake by the poor, women, and children in the district with a tax and a smaller fee. However, a shortcoming of this investigation was the short time frame of assessment.

Schneider[24] compared use and expenditure of those enrolled in micro health insurance in Rwanda with those not enrolled (who had to pay user fees). 1 year after the start of the schemes, much higher uptake rates and faster care-seeking were recorded for those with insurance than for those without. The probability of service use still rose with socioeconomic status for the uninsured, whereas this difference was not substantial in the insured. However, an enrollment rate of 8%, although high for such schemes, shows the rapid scaling up that would be necessary for the schemes to start to improve accessibility of services for all.

National health insurance

To experiment with large-scale insurance schemes is clearly hard. Most studies of national insurance systems are in the form of descriptive case studies, such as one in Thailand.[25] Researchers in Colombia analysed whether out-of-pocket payments became less regressive after the Colombian health-care reform of 1993. This reform extended health insurance coverage to previously uncovered groups, such as informal sector employees and the poor, who were identified by a proxy means test.[26] Data from three nationwide surveys between 1985 and 1997 were used to examine changes before and after the reform. No controls were available, and data were available for only a few years after full implementation of the reform. Findings are not conclusive, revealing a regressive trend if out-of-pocket expenses are compared with household income, and a progressive one if they are compared with household expenses. Dow and Schmeer[27] assessed the effect of a large national health insurance expansion in Costa Rica in the 1970s. Having controlled for other factors that varied alongside the introduction of health insurance, the researchers recorded that an

expansion in insurance did not have a major role in the decline of infant and child mortality in Costa Rica.

Contracting health services

Researchers in Cambodia assessed two models of contracting for health services against control districts.[27] Districts were selected randomly and assigned either to contracting out (two districts), contracting in (three districts) or controls (four districts). Under contracting out, non-governmental organisations were given full responsibility for the delivery of specified services in a district, including drug procurement and hiring and firing of staff. Under contracting in, non-governmental organisations worked within the existing system to strengthen district administrative structures. Control districts received no external support but did receive a small subsidy toward service delivery. On the basis of a household and facility survey 2 and a half years after contracts started, contracted districts outperformed control districts in terms of predefined coverage indicators such as immunisation and attended deliveries. Contracted-out models outperformed contracted in. Much of the rise in health-care use in contracted districts was attributed to enhanced use by households of low socioeconomic status. However, funding flows seem to have differed between the districts, with contracted-out districts receiving larger per head payments from government or donors. Some of the reported differences in use might be because of greater availability of resources in the contracted-out districts.

Conditional cash transfers

An innovation in Latin America is the use of conditional cash transfers to encourage households to access preventive health services, nutritional support, and education for children. Progresa (now Oportunidades) is a large-scale, incentive-based welfare programme in Mexico which includes educational, nutritional, and health components.[29] Poor families receive cash transfers conditional on (1) every family member attending preventive health services, (2) children aged under 5 years, and lactating mothers regularly attending health education and growth monitoring, and (3) pregnant women attending antenatal clinics. An additional cash transfer is given to families with school age children if they are enrolled and attend school.[30] During the roll out of the programme, some villages were randomly assigned to control or treatment groups, which made it possible to assess the effect on use of facilities and on health. Substantial improvements in both were reported.[30] The programme as a whole (including education and nutrition interventions) was associated with improved growth and reduced rates of anaemia in low income infants and children.[29]

In Honduras, a similar programme that made direct payments to families contingent on regular use of preventive health services was investigated in a cluster-randomised trial. Direct payments to households had a large effect overall on coverage of antenatal care and well-child checkups, although these payments might have acted as an incentive to increase family size too.[31] In Brazil another similar programme was assessed with a focus on child growth as the outcome.[32] The anthropometric status of Brazilian children who receive a monthly cash transfer conditioned on regular contacts with the health system was compared with that of a similar group of children who were selected to receive the same benefit but were then accidentally excluded. Because of this origin of the control group, no baseline data were available. A negative effect on anthropometric status was associated with participation in the programme. This could have been a result of differences between the two groups before the start of the programme, or of the perception by mothers (as a result of the design of a previous programme) that if their children gained weight they would be excluded from benefits.

Case studies

Applying the EPOC group criteria excluded almost all articles identified by our initial search because most were written as case studies or policy reviews. Case studies usually provided even less robust estimates of effect, but could provide useful insights into the context and factors that contributed to successful or failed implementation of financing approaches. Some case studies describe new or innovative programmes—eg, some examples include work on the Bamako Initiative,[11] vouchers for insecticide-treated nets in Tanzania,[33] the use of a health equity fund,[34] and incentive payments to health workers in Cambodia,[35] or, they analyse and seek to explain failed or inadequate implementation, such as failures of cost recovery or inadequate operation of exemption mechanisms.[16,36,37] Some of the reports reviewed above according to the EPOC group criteria also provided case study-style explanation of the quantitative trends reported; these were particularly useful from a policy-making point of view.[12,16]

Case studies sometimes combine qualitative and quantitative methods, although they are often criticised for doing neither well. While not producing statistically generalisable findings, the possibility of analytical/theoretical generalisation from case studies is recognised by qualitative researchers.[38–40] However, the case studies we reviewed almost universally failed to apply the explicit theoretical framework that would allow such generalisation. The broader relevance of findings was rarely discussed.

Discussion

Most health systems research remains small scale, with findings of restricted applicability. The evidence base on alternative modes of health financing in low and middle income countries is no exception. Our review highlighted both an absence of well designed large scale evaluations of the effect of alternative financing

interventions, and a multitude of case studies offering descriptions of specific experiences but with little methodological rigour.

Of the studies that were most in line with EPOC criteria, many were taking advantage of natural experiments or using data that were not obtained specifically for the purpose of the investigation. With the exception of the study on alternative cost recovery methods in Niger,[22] the assessment of Progresa[30] and the Cambodian contracting pilot,[28] there was little opportunity for evaluation to be planned systematically alongside implementation. This resulted in a range of limitations. In most cases there was an absence of socioeconomic data, an absence of controls, a short timeframe in which effects were measured, and difficulty in defining the desired outcome (eg, whether an increase in use improved health outcomes). Furthermore, more than one intervention was often implemented—eg, user fees with quality improvements, making it difficult to tease out causality. All these weaknesses stem from a combination of insufficient resources for large scale health systems assessment, the absence of demand by policymakers for better evidence and the practical difficulties of designing large scale experimental studies for a complex, system-wide issue such as health financing. Having controls in such studies can raise ethical issues, and randomisation might be difficult both ethically and practically, demanding involvement in the very early stages of policy design.[41] However, if planning and coordination were strengthened, more use could be made of both step-wedge designs (in which implementation occurs in a phased manner and areas act as controls before they receive the intervention),[42] and time series data from national level policy implementation.

Furthermore, any one study design has limitations and it is important to be aware of the strengths and weaknesses of different approaches. Robust intervention designs can address some questions but they might not be sufficient to guide implementation. Although the menu of financing options for any government is restricted, the range of ways in which the options can be implemented, packaged, succeed or fail is wide. The question is not only what to do (governments might have few alternatives), but also how to do it as successfully as possible. Even when large scale quantitative assessment studies provide clear evidence on the potential of specific interventions, there is often an important set of unanswered how and why questions related to implementation issues. These might be better answered by a series of case studies, which are argued to be good for understanding complex causal links between many variables.[39,43] Victora and colleagues[41] emphasise the complex causal pathways of many public health interventions, and emphasise the need to understand behavioural as well as biological steps at the systems level.

Conclusion

The reports we outline are more indicative of the published work than an exhaustive list. Extending the search to more languages and a longer time frame, and searching the grey literature in greater depth, will be a useful next step.

Reliable evidence on health financing in different settings is remarkably sparse. From this review, we can only make some cautious conclusions, but they are consistent with standard economic theory. User fees deterred use in many settings, although it is often unclear to what extent and what kind of use is most affected. Insurance systems have many attractions such as the potential for risk pooling and reduction of catastrophic expenditure, but the research evidence is still scanty for how these systems can be scaled up, and for their effect on equity. Conditional cash payments show promise for improving uptake of effective interventions and services for poor populations, but the studies cited above also show the dangers of creating an undesired response. Additionally, little is known about the implications of cash transfers for a household's broader livelihood set. The largely African origin of the user fee published work, and the Latin American origin of conditional cash transfers, also shows the importance of considering the context in which studies are done. The use of conditional cash transfers in a setting in which there are inadequate resources to provide free and quality services would be inappropriate. Investigations into contracting out (and other interventions) should avoid confounding by ensuring that there are no overall differences in resources available to intervention and control groups and would benefit from greater examination of the reasons why contracting may improve access.

Larger scale, more systematic work in many settings is badly needed, including plausibility studies as a form of non-randomised evaluation design, when randomised designs are impossible or inappropriate.[41] Developing appropriate ways of measuring socioeconomic status in data-poor contexts should be a priority, as well as more proactive engagement with policymakers to build up demand for this kind of research.

Important contributions could also be made by improving the quality of case study work, and through multicentre case studies that look across countries at why things do or do not work in specific settings. Such studies could provide crucial insights into the complex experiences that accompany failures of implementation.

A useful set of guidelines for improving the clarity of reporting of non-randomised designs has been provided by the TREND statement,[44] which complements those guidelines available for randomised designs.[45] The development and application of similar quality criteria for designing, undertaking, and reporting both large-scale quantitative and case study research on health financing is highly desirable. Larger scale, upfront funding for evaluation of health financing initiatives is also necessary

to ensure an evidence base that corresponds to the importance of this issue for reaching development goals.

Acknowledgments

Natasha Palmer, Lucy Gilson, Anne Mills, and Dirk Mueller are all members of the Health Economics & Financing Programme, which is funded by the UK Department for International Development. The Department supports policies, programmes, and projects to promote international development, and provided funds for this study as part of that objective but the views and opinions expressed are those of the author(s) alone. Funds from the Bill and Melinda Gates Foundation's Policy Research Network also supported this work. We thank John Eyers for sharing his knowledge of PubMed and other databases and Diane McIntyre for comments on a draft of this article.

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How to bridge the gap in human resources for health

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Lancet 2004; 364: 1451–56

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Human resources are the crucial core of a health system, but they have been a neglected component of health-system development. The demands on health systems have escalated in low income countries, in the form of the Millennium Development Goals and new targets for more access to HIV/AIDS treatment. Human resources are in very short supply in health systems in low and middle income countries compared with high income countries or with the skill requirements of a minimum package of health interventions. Equally serious concerns exist about the quality and productivity of the health workforce in low income countries. Among available strategies to address the problems, expansion of the numbers of doctors and nurses through training is highly constrained. This is a difficult issue involving the interplay of multiple factors and forces.

Introduction

Human resources have been described as "the heart of the health system in any country",[1] "the most important aspect of health care systems",[2] and "a critical component in health policies".[3] There is a consensus that despite their importance human resources have been a neglected component of health-system development in low income countries.

Much is needed of health sectors in the present decade. At least three and arguably all of the Millennium Development Goals will not be achieved without improvement in the functioning of health systems.[4] Although substantial new resources are promised to health systems, many of the constraints cannot easily be resolved by money alone.[5] A substantial portion of these new resources are earmarked for expanding access to HIV/AIDS treatment. For goals in this specialty to be achieved, primary care systems will need to provide a more complex intervention than has ever been expected of them, and partnership between primary and secondary levels of systems will have to become much more effective.

The present situation

A new, up-to-date, and complete country and international database of health workers has recently become available. A comparison of estimated ratios of health workers to population sheds some light on the issue (table 1). Disparities across countries are large.

These ratios should be interpreted carefully because the definition, training, and quality of professional groups differs from country to country. Nevertheless, these differences may mean that disparities in the data are underestimated when further qualifications and quality in general is taken into account. High income countries have three to four times more doctors and nurses than lower income countries per unit of population.

The importance of estimated health worker to population ratios has been questioned. Analyses done between 1978 and 2001 did not show evidence of a causal link between numbers of health workers and health outcomes such as mortality rates. However, a re-analysis with more complete data that have become available shows strong evidence for such a link. Anand and Baernighausen[6] state that human resources for health in aggregate terms matter significantly in explaining maternal mortality, infant mortality, and under 5 mortality rates. The analysis suggests that physicians matter most, and that the maternal mortality rate is most responsive to larger numbers of health workers, perhaps because maternal deaths are most directly associated with absence of appropriate medical intervention.

Estimates of the physician/nurse ratio have been produced from the same data (table 2). These ratios are surprising in that some low income countries in Asia and South America have ratios far larger than the global average. This anomaly seems to imply that investment in human resources for health has not only been insufficient in absolute terms but has also been inefficient in its distribution.

Although data are scarce, some evidence suggests that the pool of health workers in low and middle income countries has been depleted and that the situation may be getting worse. One reason is migration to greener pastures.[2,8,9] Marchal and Kegels[9] report that 27 000 highly qualified Africans, including doctors, emigrated between 1960 and 1975, an average of 1800 people per year. This annual rate had risen to 8000 by 1987, and to

	Physicians per 100 000 population	Nurses per 100 000 population
Bangladesh	23	24
India	51	61
Nepal	5	26
Pakistan	66	47
Sri Lanka	43	79
Papua New Guinea	5	53
Peru	117	67
Bolivia	73	32
Niger	3	27
Brazil	206	51
Global average*	170	399

Source: WHO[7]. *All countries in database.

Table 1: **International comparisons of physician and nurse population ratios**

	Physician/nurse ratio
Bangladesh	0·96
India	0·83
Nepal	0·19
Pakistan	1·4
Sri Lanka	0·54
Papua New Guinea	0·09
Peru	1·74
Bolivia	2·28
Niger	0·11
Brazil	4·04
Global average	0·43

Source: WHO[7].

Table 2: **International comparisons of physician/nurse ratios**

20 000 during the 1990s. Mangwende[8] reports that 18 000 Zimbabwean nurses work abroad and Weiner and colleagues[10] report that a third to a half of South Africa's medical graduates emigrate.

Migration from developing countries provides some compensation. Annual remittances from overseas employment in general have been estimated at US$11·5 billion for India, $6·5 billion for Mexico, and $3·5 billion for Egypt.[11] In recognition of this fact, some countries such as the Philippines operate a managed migration policy and the Philippines itself is the largest source of registered nurses working overseas. Nevertheless, there are 30 000 unfilled nursing positions in the Philippines, and in countries that do not encourage migration, there are large numbers of vacancies too: in Ghana, 42·6% of doctor posts and 25·5% of nurse posts, and in Malawi 36·3% and 18·4% of doctor and nurse posts, respectively, are vacant.[11]

Initiatives have been taken toward responsible recruitment policies but it is not clear whether they have yet had much effect. For example, the UK National Health Service has signed up to an ethical recruitment code that lists nearly every developing country as countries in which National Health Service managers should not recruit. Nevertheless, recruitment agencies find loopholes in the system.[12] An estimated 40 000 overseas nurses are reported to have registered in the UK between 2001 and 2004, mostly from the Philippines, South Africa, Australia, and India,[13] and more than half of the new professional registrations in Britain were from overseas during 2001 to 2002.[14] However, many of these data originate from media coverage, which can be inaccurate.[15]

Kurowski and colleagues[18] assessed health-worker availability against health system needs in Tanzania and Chad. They showed, first that there are stark gaps between the number of health workers available and the number needed for provision of basic health services in these countries. On the basis of projections from these data, the researchers estimated that sub-Saharan African countries as a whole are facing an employment shortage of 720 000 physicians and 670 000 nurses. Second, the skills needed to implement basic packages of services are either inadequate or set at unrealistically high standards, making them difficult to put into practice. Third, the rate of production of health workers lags behind losses from the system because of deaths, attrition, and, increasingly, emigration.

Factors causing present problems

A host of causes underpins this worsening situation. The HIV/AIDS epidemic is killing health workers. In 1997, Malawi lost 44 nurses as a result of AIDS, which is 44% of the annual number of nurses trained; in 1999 in Zambia 185 nurses died, which is 38% of the annual number of nurses trained in government institutions.[19] Problems of absence from work and reduced productivity associated with the epidemic are also common. HIV/AIDS functions as a push factor in migration, increasing the numbers of health workers willing to work overseas.

Training capacity is especially low in Africa where problems are most pronounced. Two thirds of sub-Saharan African countries have only one medical school. Some have none.[2] Investment in educational infrastructure and educators is declining.[2,20] Training strategies tend to focus on highly skilled but easily exportable workers,[21] and to emphasise initial training over continued professional development.

Professional bodies that protect the interests of their members have played a part in defending training that promotes a level of specialisation inappropriate to the health needs of low and middle income countries. In Uganda, midwives may supervise less than one delivery per day on average in rural facilities, but there is a need for nurses who can do both this task and the regular nursing tasks involved in delivering primary care to a rural population. However, nurses' organisations have protested against moves toward the development of a new comprehensive nurse cadre that would fulfil this role.[22] Despite these protests, it seems that the comprehensive role will be introduced. Professional bodies have at times promoted a continued breadth of practice that excludes lower level cadres from tasks they might appropriately do. The Brazilian Medical Council succeeded in securing legislation that prohibits any health professional, including university trained nurses, from prescribing any medicine. Until the law was passed both doctors and nurses were being trained in the algorithms of integrated management of childhood illness but this has now been restricted to doctors alone (Victora C, personal communication). Regulations governing extended roles for lower-level health workers are quite common.[23]

Poor working conditions and remuneration serve as additional factors that push health workers out of the public sector, the health sector, or the country. A survey of African health workers intending to migrate or already migrated showed that issues of salary and living conditions dominated, with 80% of health workers

surveyed in Cameroon citing living conditions, and 72% in Uganda and 89% in Senegal citing salary as reasons for intending to leave their country.[20] Average wages in a list of source countries were 17% of average wages in destination countries for nurses and 19% for doctors according to the data available.[20] It is not uncommon for health workers to engage in dual practice or solicit informal payments to supplement their income and this causes various further difficulties in accountability and equity of access to services.[24,25]

In the same survey reported by Vujicic and colleagues,[20] 55% of health workers in Cameroon stated that they might be persuaded to stay by improvements in health care system management, and 64%, 68%, and 36% of health workers in Ghana, South Africa, and Uganda, respectively, stated that improvements in the work environment might persuade them to stay.

Training strategies that fail to emphasise continued professional development, together with poor working conditions and remuneration, affect not only the numbers of health workers as shown by the data in tables 1 and 2, but also the quality and performance of these workers. These dimensions are not easily captured in data that enable international comparison, but are widely understood to be at least as important as more quantifiable factors in explaining the performance of the health sector.

Available strategies to address human resource difficulties

Although substantial emphasis is often put on training as a solution to human resource difficulties, the constraints to effective strategies based on training are many. Africa's paucity of medical schools points to the need for innovative approaches to improve training capacity in the short term. It is tempting to suggest that countries should invest in medical training infrastructure when this is unlikely to be feasible in the short term, and unlikely to be the most cost-effective strategy in the long term. Medical schools are experiencing an exodus of specialist lecturers, who are in many cases providers of health services themselves. Clearly, investing in physical infrastructure without the requisite personnel will not produce desired results.

There are other difficulties in a strategy that emphasises medical and nursing training in developing countries. For example, it takes at least 5 years to train a doctor and 3 years to produce a nurse; a long time, in view of the immediate need for health workers, particularly in sub-Saharan Africa.

Strategies of bonding health workers to government after training have largely failed because health workers find ways to evade the system. This failure is partly explained by absence of punitive action and capacity to enforce penalties, and availability of buy-out options.[26] However, the strategy seems to work in Thailand where bonding of doctors has been used in tandem with other incentive strategies.[27]

Since developing countries would be ill-advised to develop their own new medical schools, one strategy might be to make increasing use of the existing capacity in the developed world. Twinning medical schools in developing countries with those in developed countries that are well resourced and can provide training support in the form of training staff in neglected areas is one option. Promotion of distance learning, particularly in non-clinical areas by public health schools in the developed world, is another option. However, a major constraint to these strategies is that preparing the workforce for developing country health sectors is neither the core interest nor the expertise of most institutions in the developed world. Sufficient funding on the international level would have to support these strategies to induce developed world institutions to play a substantial part, and such funding has high opportunity costs in developing countries themselves.

In view of these difficulties, a focus on auxiliary cadres provides an alternative strategy. Skills substitution, or improving use of available skills seems to be a practical response to skill shortages,[28] and might generate efficiency gains[21] (WHO, 2000). Auxiliary cadres are often less employable abroad, especially if the qualifications involved do not easily translate into those used in the developed world, such as medical assistant or clinical officer. Conversely, nurse training is a highly saleable asset in the international market. One report from the Philippines suggests that doctors are retraining as nurses there in order to more easily emigrate (Ramanos P, personal communication).

Health workers who are normally judged auxiliary are increasingly becoming the main providers of health services in many countries.[28] In Africa, for example, nurse aids, medical assistants (with more basic training than a nurse), and clinical officers (the equivalent of medical assistants in Tanzania and Uganda) are doing essential medical tasks, especially in rural areas, despite the existence of professional restrictions and regulations. A good example is Malawi, where clinical officers are a major resource. They undertake surgical procedures and give anaesthetics as well as providing medical care. Table 3 shows the numbers of clinical officers or medical assistants in seven African countries compared with the number of doctors. These cadres usually have about 3 years of post-school education pre-service and 1 year or 18 months further training in post.[29]

Research on use of auxiliary cadres is very restricted and much of the material is anecdotal.[28] Fenton and colleagues[30] explored the safety of clinical officers in Malawi by looking at outcomes in emergency caesarean section. They reported an overall maternal death rate of 1·3% — high, but much lower than the expected rate if services did not exist or delays had been long. Neonatal

	Clinical officers/medical assistants	Doctors
Ghana	442*	1600
Kenya	4300 (2300 public sector)	4900 (1200 public sector)
Malawi	442	315
Mozambique	627*	278*
Central African Republic	182	121
Uganda	750	671
Zambia	1458	900

*Public sector numbers only. Source: simplified from Dovlo (2004).[29]

Table 3: **Estimates of practising auxiliaries and doctors in selected African countries**

mortality was 13%. None of the anaesthetists was medically qualified, but there were much better outcomes when these practitioners had received anaesthetics training; the percentage of maternal deaths was 0·9% compared with 2·4%. No substantial difference in outcome was shown between surgeons who were medically qualified and those who were trained initially as clinical officers.

A growing number of reports from developed countries show that nurses can be safe and effective in place of doctors in primary care.[31] Mid-level midwives and other skilled health workers have been shown to provide high quality surgical abortion.[32] The general fear is that use of non-medically qualified health staff will affect quality and safety. While this is an important issue, it should be remembered that even if new professionals are less safe than doctors, they might be much safer than nothing. The available studies are very limited, and therefore care should be taken in interpreting results, but what evidence exists suggests that, at least in some circumstances, well trained clinical officers can safely substitute for doctors in the provision of important but well understood procedures.[33]

Community health workers act as the first line of contact with the health system in most low and middle income countries. These workers are selected community members who are trained in general primary care functions (—eg, treatment of diarrhoea, immunisations, health education and nutrition, environmental sanitation, and malaria control) or in specific activities (—eg, DOTS supervision, family planning, rehabilitation, and nutrition).[34]

The restricted evidence available on the use of community health workers from Gambia, South Africa, Tanzania, Zambia, Madagascar, and Ghana suggests that these workers enhance the performance of community level health programmes and some evidence shows that they are cost-effective.[35,36] Health services such as condom distribution, food and hygiene counselling, distribution of insecticide impregnated bed nets, and nutrition education can safely be provided by trained community workers. However, there have been concerns about the sustainability of such strategies.[37]

Traditional birth attendants have been shown to provide essential and sometimes the only delivery services to rural women.[38] Training more traditional birth attendants in midwifery raises the number of attended deliveries.[39] However, evidence on effectiveness is mixed. Training traditional birth attendants has been shown to heighten knowledge and, to an extent, practice, but does not result in observable reductions in maternal or infant morbidity and mortality.[36]

Staff retention and support

The way the health system is funded, organised, managed, and regulated affects heath workers' supply, retention, and performance. The contested policies of public and health sector reform can be construed as attempts to craft the incentive environment to produce improved performance.

There is some reported evidence that use of provider incentives and enablers can improve performance under specific circumstances. For example, Eichler and colleagues[40] show that indicators of achievement that were used to establish bonus payments improved when a bonus system was introduced in Haiti, and use of financial incentives was reported to positively change health worker behaviour in terms of heightened productivity in Cambodia.[41] In fact, based on evidence from a wide range of settings, there is little doubt that health workers do respond to incentives. Birch (UK),[42] Rodrigues (Brazil),[43] Mooney (Denmark),[44] Kroneman and Nagy (Hungary),[45] and Lang et al (Taiwan)[46] provide just a selection of examples.

The difficulty is to ensure that incentives motivate the performance desired. Paying health workers (or promoting them, or providing ad hoc benefits such as access to training programmes) according to measured indicators of activity for example is likely to improve the indicators. However, it might not improve the performance the indicator is intended to measure for one of two reasons. First, data might merely be manipulated. Monitoring strategies that protect against this eventuality are more expensive than trust of health workers' own data provision. Second, an indicator can improve without more of the activity intended to be measured happening. For example, patients can be encouraged to accept more care than is needed, or to continue to occupy beds when they could be discharged. It is difficult (and therefore costly) to find indicators that are robust against both situations.[6,47–49]

There are further difficulties even when monitoring issues are resolved. First, those aspects of performance that are not monitored or rewarded, usually because there are particular difficulties in doing so, are likely to be neglected. Second, much health work is done in teams. Attaching bonuses or other rewards to team work dilutes the strength of the incentive effect, but continuing to allocate rewards as if outputs were produced individually might undermine team work.[50,51]

Finally, when transparency of the reward system in place is poor, its credibility will be questioned and health workers might not respond to the explicit incentive system at all.

Perhaps the most difficult problem to overcome in crafting incentives effectively is the danger that treating health workers as if their motivations were wholly financial might undermine whatever produces the ethos of public service. Such an ethos is likely to emerge slowly from a complex set of factors, and reforms that do not take this factor into account will undermine the development of the public mission itself.[52]

In view of all these difficulties, it is not surprising that the grounds of public and health sector reform are so strongly contested, or that reforms seem to have undermined human resources in health sectors as often as making a positive contribution. That is not meant to imply that leaving the incentive environment to whatever happens to be the default is more likely to be a better option than reforming.

Which strategies offer the most promise?

There is an urgent need for more evidence to inform this debate. Although the volume of reported discussion in relation to human resources in health has risen over the past few years, funding for investigations that could provide new data to distinguish between more and less promising strategies has not been forthcoming.

On the basis of the available evidence, three areas seem to have the most scope to make advances. First, expansion of the numbers and roles of auxiliaries whose qualifications are not internationally recognised seems to be a quiet success story, providing large numbers of health workers who keep the system running in a number of countries. Much more needs to be documented about the parts played by these workers and their safety in different areas. More too could be understood about the efficiency of alternative training strategies. Planned dialogue with professional bodies needs to be built into any strategy to pursue this option.

Second, incentive environments have been ignored for too long. Careful understanding of the various aspects of this issue is needed, requiring much more data and experimentation in a wide range of settings. How health workers will respond to different reimbursement structures, monitoring strategies, and management contexts is largely unknown.

Third, although there has been little success so far, it is difficult to believe that countries who are importing health workers from developing countries could not do more to mitigate the present outpour. Buchan and colleagues,[26] for example, argue that besides the need to improve working conditions for health workers in both exporting and importing countries, there are further options to be explored in relation to multilateral agreements and compensation arrangements. Pressure from the international community and sympathetic groups within recipient countries needs to be brought to bear on recipient country governments to leverage movement on these issues. Exporting country governments can also do more.[53]

Finally, it has been the conclusion of many researchers commenting on this specialty that the human resource management function needs to be substantially upgraded in the public sector as a whole, and specifically the health sector. To make headway in the directions suggested here, human resource management needs to be understood as a strategic function rather than administrative routine.

***Panel:* Meeting Millennium Development Goals.**

Interventions recommended by the Commission on Macroeconomics and Health for scaling up to meet Millennium Development Goals by 2015:[16,17]

1 Childhood diseases: integrated management of childhood illness, expanded programme on immunisation, which includes vaccination for tuberculosis, diphtheria/polio/tetanus, and measles

2 Maternal conditions: antenatal care, skilled birth attendance, postnatal care, family planning, and emergency obstetric care

3 HIV/AIDS: voluntary counselling and testing, public condom distribution, information and education in schools, prevention of mother-to-child transmission, sexually transmitted infection syndromic management, palliative care, prevention and treatment of opportunistic infections, and highly active antiretroviral treatment

3a Malaria: diagnosis and treatment, insecticide-treated nets

3b Tuberculosis: diagnosis and treatment, directly observed treatment

Acknowledgments

We received no special funding to write this report. We declare that we have no conflicts of interest.

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Achieving universal coverage with health interventions

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Lancet 2004; 364: 1541–48

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Cost-effective public health interventions are not reaching developing country populations who need them. Programmes to deliver these interventions are too often patchy, low quality, inequitable, and short-lived. We review the challenges of going to scale—ie, building on known, effective interventions to achieve universal coverage. One challenge is to choose interventions consistent with the epidemiological profile of the population. A second is to plan for context-specific delivery mechanisms effective in going to scale, and to avoid uniform approaches. A third is to develop innovative delivery mechanisms that move incrementally along the vertical-to-horizontal axis as health systems gain capacity in service delivery. The availability of sufficient funds is essential, but constraints to reaching universal coverage go well beyond financial issues. Accurate estimates of resource requirements need a full understanding of the factors that limit intervention delivery. Sound decisions need to be made about the choice of delivery mechanisms, the sequence of action, and the pace at which services can be expanded. Strong health systems are required, and the time frames and funding cycles of national and international agencies are often unrealistically short.

Choice of priority interventions

In this article we build on the issues raised in preceding reports,[1–3] examining how health programmes known to be effective in low-income countries can be taken to scale. Scale has become a popular word, as evidence mounts that available, affordable, and effective interventions are not reaching many of those who need them.[4,5] As documented in the first article of this series[1] and elsewhere,[6] people not receiving services are disproportionately from among the poor. Our emphasis will be on going to scale, defined as a policy that builds on one or more interventions with known effectiveness and combines them into a programme delivery strategy designed to reach high, sustained, and equitable coverage, at adequate levels of quality, in all who need the interventions.

We assume for our aims that the priority interventions being taken to scale are limited to those known to be feasible, affordable, and effective for implementation in low income countries,[7,8] although certainly these assumptions are not always correct. Examples of going to scale in the absence of known population or programme effectiveness, affordability, and feasibility include plans to achieve high national coverage in very poor countries with antiretroviral drugs for individuals with AIDS,[9] or with nevirapine to prevent mother-to-child transmission of HIV.[10,11]

Often, too little thought is given to the selection of interventions to be implemented at scale in a specific setting. Availability of donor support sometimes seems to have a larger role in determining the choice of interventions than considerations related to burden of disease, effectiveness, or sustainability. Preventive child survival interventions offer a good example. Most countries have many governmental or non-governmental organisation driven programmes aimed at providing several vaccines, micronutrients (vitamin A, iron, and iodine being the most common), insecticide-treated materials in malarious areas, skilled delivery attendants, breastfeeding promotion, and growth monitoring, among others. Additionally, curative interventions for child survival often include oral rehydration therapy, antibiotics for pneumonia and sepsis, and antimalarials. Little attention is given to whether or not countries have the management capacity to implement these interventions at high coverage. Even in high quality programmes, mediocre coverage can be achieved with several interventions,[7] and few if any programmes are delivered at near universal coverage.

Would it not be preferable to have universal coverage with a few effective interventions, rather than low coverage with many? In particular, children from the upper socioeconomic strata tend to receive several life-saving interventions simultaneously, whereas many of the poorest children fail to receive even one intervention.[12] Piggy-backing approaches to intervention delivery, such as adding micronutrient distribution to national immunisation days, might seem to be cost-effective, but unless coverage is very high, combining different interventions within one delivery mechanism might contribute to inequity—in the extreme case in which all interventions are delivered by the same mechanism, either a child receives the whole package or nothing at all. Such equity considerations have to be balanced against the efficiency gains that might arise from combining interventions, but as Gwatkin and colleagues[1] argue, there is no clearcut justification for prioritising efficiency relative to equity.

External benefits, or the benefits of interventions for individuals who do not receive them (eg, the herd effect in vaccination programmes,[13] and growing evidence that the use of insecticide-treated nets in a community provides part protection to non-users by reducing malaria transmission[14]) should be considered when selecting the set of interventions or programmes that can be taken to scale in a specific setting. The appropriate number of interventions to be scaled up will also depend on training of staff and resources available,

and on the local epidemiological profile, and could be expanded as health systems are strengthened and new interventions become available.

Enhanced public health attention to achieving full, sustained, and equitable coverage is a welcome change, and one that needs to be nurtured. At the same time, the issue of quality should not be forgotten. Ideally both quality and coverage should be set at high levels, but trade-offs are often made in practice that compromise public health benefits. Reported work offers many examples. Integrated management of childhood illness (IMCI) is a delivery strategy that was first promoted by WHO and UNICEF. Training health workers in this strategy has led to improved performance in Tanzania,[15] Bangladesh (Arifeen SE, personal communication,) and elsewhere.[16,17] (Pariyo GW, personal communication) As a consequence, many governments including the government of Uganda committed themselves to implementing the IMCI strategy throughout their countries within 2–3 years. Working under pressure, managers and donors took shortcuts that had negative effects on the quality of case management training and efforts to strengthen needed health-system supports, such as supervision and district-level management. The reductions in quality curtailed the expected effects of IMCI on the health and nutritional status of children, even in areas where reasonably high proportions of health workers had been trained.[18]

Health delivery issues

A proportion of the failure to achieve adequate and equitable population coverage with good public health programmes can be attributed to weaknesses in health delivery systems. Alternative strategies for strengthening the delivery of interventions have received little attention.[19] This lack is largely attributable to the fact that effectiveness studies have often failed to separate the health impact of a specific intervention (eg, a vaccine), from the delivery strategy used to reach the target population—for example, making the vaccine available in health facilities, with outreach posts, delivering it through community health workers, or organising national immunisation days. Many efficacy trials and effectiveness assessments use methods of service delivery that are ill-suited to scaling up within available resource constraints, because they are concerned with measuring impact in situations that maximise the chance of a positive effect.

The choice of delivery strategy can affect quality, coverage, cost, sustainability, and equity. To what extent do choices about how to deliver programmes within one geographical or managerial setting result in synergies or antagonisms between different interventions and how these can be addressed? Delivery strategies should be subjected to the same rigorous effectiveness and cost-effectiveness assessments as the interventions themselves, with a conceptual framework and research designs that will yield results with known generalisability.[4]

The growing number of publications on implementation of study findings and promotion of the uptake of effective interventions can contribute in important ways to the evidence base on delivery strategies for public health programmes.[20,21] One review summarised evidence of effectiveness across various approaches to implementation of findings by policy makers, the public, and health-service providers. The contributors identified the low priority accorded health services and systems research as one reason for the shortfall of evidence in this area, and called for interdisciplinary and meta-institutional efforts to strengthen work on implementation strategies and the uptake of research findings.[20]

There is an urgent need for more rigorous assessments of alternative delivery strategies for specific public health interventions. One study compared the performance of social marketing versus unassisted commercial sector delivery of insecticide-treated materials for the prevention of malaria in southern Tanzania.[22] The results showed substantially greater gains in coverage through social marketing than through the commercial sector alone, for the study population as a whole and for the poorest income quartile, households with children or pregnant women, and households located on the edge of participating villages where access to the social marketing activities was assumed to be lowest (figure 1). SB Coutinho and colleagues (Coutinho SB, personal communication) have investigated the effectiveness of adding postnatal home visits to the recommended activities of the baby friendly hospital initiative, and shown that in the absence of follow-up visits at home, baby friendly hospitals have only a short-lived effect on breastfeeding practices. Examples of assessments of alternative delivery mechanisms for public health interventions and programmes include those examining community-based health workers for continuous delivery of family planning services,[23] descriptive evidence of lessons learned from efforts to expand coverage with treatment for multidrug-resistant tuberculosis,[24] or the use of national days versus facility-based services and outreach for the delivery of immunisation services.[25] Combination of the delivery of one intervention with existing successful delivery mechanisms is receiving heightened attention, for example the delivery of drugs to prevent malaria within national immunisation campaigns,[26] or as a part of antenatal services,[27] but as discussed above these combined delivery approaches might have a detrimental effect on equity unless coverage is near universal.

Type of programme

The debate between proponents of vertical and horizontal approaches to health delivery is not new.[28–32] Horizontal approaches tend to incorporate several health

interventions as part of a comprehensive primary care approach, usually delivered through government health facilities. Vertical programmes, on the other hand, tend to deliver selected interventions, often independently, with specialised management, logistics, and delivery mechanisms. These services could be delivered parallel to, or even outside, other essential interventions targeting the same populations.

This debate has been blurred by an absence of conceptual clarity, as a result of failure to separate the vertical or horizontal administrative organisation of a programme from whether the programme is selective (covering one or a few diseases or conditions) or comprehensive (covering many diseases or conditions). Although there is a tendency for vertical programmes to be more selective, and for horizontal approaches to be more comprehensive, this is not always the case.

The term integrated is often used to refer to comprehensive programmes. We will reserve it for programmes that, in addition to being comprehensive, likewise attempt to combine the management and prevention of several conditions at the individual level. A good example is IMCI, which takes advantage of clinical attendances motivated by a specific disease to diagnose other conditions and to deliver preventive interventions.

Comprehensiveness reached a high point in the Declaration of Alma-Ata in 1978,[33] when primary health care was adopted, at least in principle, as the approach for achieving health for all by 2000. However, the difficulties of providing comprehensive care were recognised almost immediately, and resulted in the development of the selective primary health-care strategy in 1979. This strategy encouraged the delivery of a few key interventions "by either fixed or mobile units".[34] Throughout the 1980s, interventions aimed at improving child survival were delivered through largely vertical and selective programmes such as WHO's Expanded Programme on Immunisation and the Control of Diarrhoeal Diseases and Acute Respiratory Infections programmes. In 1993, the World Bank's World Development Report advocated the delivery of an essential package of key preventive and curative interventions, which is a hybrid between selective and comprehensive approaches.[35] This approach was often viewed as an end in itself rather than a strategy supporting the development of sustainable, functioning health systems in the longer term. In the specialty of child health, the mood swung back to comprehensiveness and integration in 1996 with the launching of IMCI by WHO and UNICEF,[36] a strategy addressing several key illnesses that accounted for most child deaths in poor countries. The international mood now is unclear. At the same time that substantial international funding is being directed to initiatives addressing a single or a few diseases—eg, the Global Fund for HIV/AIDS, Malaria and Tuberculosis,

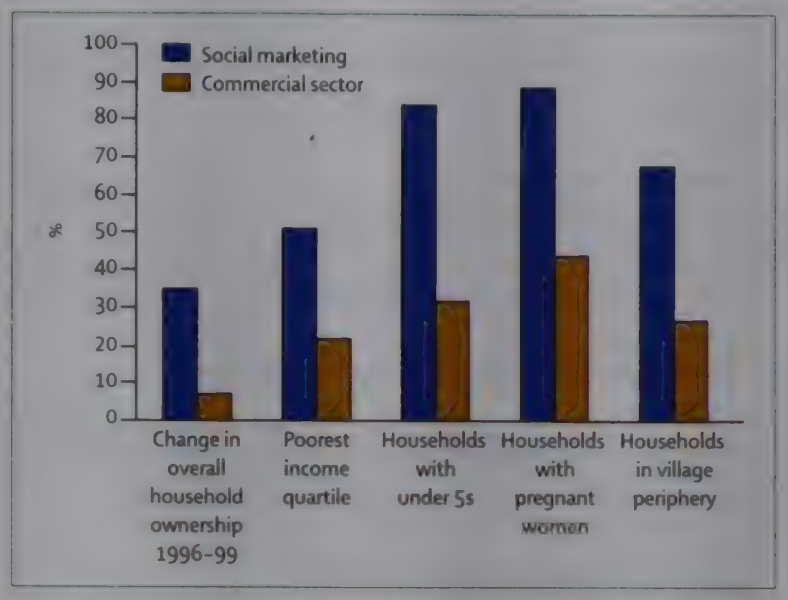

Figure 1: **Household ownership of mosquito nets in two districts of southern Tanzania, 1999**

or "3 by 5"—the new leadership at WHO is pledging its support to primary health care.

In fact, virtually all intervention delivery strategies in low income countries include a mix of both vertical and horizontal organisation, and of comprehensiveness and selectivity.[32] Vertical programme management—ie, a programme that is institutionalised in a vertical way in terms of policy, programming, and budget, etc, should be separated from vertical delivery strategy, when the programme intervention is delivered on its own—eg, national immunisation days or vector control initiatives. Programmes might consist of the wrong mix. For example, IMCI is definitely a horizontal approach at the point of delivery. First-level health workers, who provide general health care to individuals of all ages, are trained to provide over ten child survival interventions in an integrated way. Nevertheless, IMCI implementation did badly in several countries because the strategy was not sufficiently vertical at the national and district levels.[16,37] The absence of a vertical management organisation meant that there were no full-time coordinators for the IMCI programme, operational plans or specific budget lines, and these shortcomings precluded full implementation at the health facility level.

The political and organisational context is also very important. Essentially, the most appropriate mix of vertical and horizontal organisational structures needs to be established. This mix often varies on the basis of the human and financial resources available, the urgency to achieve results, the organisation of health services, and the natural development of programmes over time (panel 1). In situations with few resources and weak health systems, responses to the new and urgent tend to be vertical and selective. When decentralised health systems are better established and longer-term planning is adopted, horizontal and comprehensive mechanisms tend to dominate. Vertical approaches seem to be more attractive to donors, who want rapid and hard-hitting results to feed back to their

***Panel 1:* Situations that might favour vertical or horizontal delivery strategies**

Horizontal programmes

- Strong, decentralised health systems
- Endemic conditions
- High administrative or management capacity nationally or provincially
- Emphasis on long-term service strengthening and sustainability
- Less likely to obtain external funds
- Integrated programmes covering various illnesses and interventions
- Interventions often technically simple
- Use of health services is high
- More responsive to local needs and community participation

Vertical programmes

- Weak or centralised health systems
- Epidemics or rare diseases
- Low management capacity at district or health facility levels
- Emphasis on short-term effects through high coverage levels
- More popular with donors
- Selective programmes restricted to a few key illnesses and interventions
- Interventions are technologically complex
- Low uptake of health services
- Responsive to nationally or internationally defined priorities

constituencies, whereas investment in health-systems strengthening needed for delivering comprehensive programmes is less appealing. Verticality might likewise attract health managers, because the coexistence of several vertical programmes might mean that a larger number of high-level staff have their own discretionary funds, vehicles, drivers, etc. The pressures on national governments to apply for resources from new financing instruments such as the Global Fund to fight AIDS, TB, and Malaria, and for rapid disbursement to show the need for such funds, could further reinforce pressures for verticality and undermine the opportunities that might exist to use these instruments to strengthen health systems. Paradoxically, these pressures are often strongest in the weakest health systems.

In general, as shown by the IMCI example, there might be a need to combine a vertical approach at higher levels (eg, national policies and programme management) with a horizontal approach at lower levels (eg, case management and combined delivery of essential interventions directed at the same population groups). In weighing the balance between vertically and horizontally organised programmes, a temporal perspective should be included. When health systems are weak, vertical programmes are often the only way to circumvent the barriers posed by poorly functioning services. However, as systems are strengthened, horizontal programmes become more feasible.[31] Much of the discussion in this section is based on personal observations of the contributors and of those cited as references. Oliveira-Cruz and colleagues[31] emphasised the inadequacy of data available for evaluating policies for delivery strategies and for making valid comparisons of different approaches to intervention delivery. In the last article of this series, the knowledge gaps and research priorities in the health systems specialty are emphasised.

Costs

When faced with the issue of going to scale with a given programme, the first question that many policy-makers will ask is how much will it cost? Experts have estimated the costs of going to scale with specified packages of health interventions, as in the 1993 World Development Report[35] and the Commission for Macroeconomics and Health.[8] The World Bank has estimated the resources needed to achieve the Millennium Development Goals,[38] which extend beyond health to include the full range of development and human rights issues. A report for the Copenhagen Consensus meeting in May, 2004, estimated the cost of addressing the burden of communicable disease by delivering essential HIV/AIDS and malaria interventions and strengthening the basic health system.[39] Although each of these groups has used different approaches and assumptions (table 1), they share the aim of mobilising resources for improving health in poor countries. In general, aggregate estimates should be taken with a grain of salt, as they need huge assumptions in face of severe gaps in information about existing levels of quality, coverage, cost, and effectiveness of interventions.

Global estimates are useful for advocacy goals, but have important limitations as supports for operational decision-making at country level and below. Nonetheless, costing exercises raise two important issues. First, they emphasise the difficulties implicated in estimating the resource requirements for scaling up, and second, they identify some of the operational issues involved, including national absorptive capacity—ie, the degree to which additional funds can be effectively spent.

Estimating the costs of going to scale necessitates specification of the interventions being expanded, the level of quality adopted for their delivery, the means of delivering the intervention, the population targeted (size and other characteristics), the coverage to be achieved, and the full range of financial and physical resources needed. These issues are closely related to one another. Available cost-effective interventions are only reaching a fraction of people who need them, and there are different ways of delivering a specific intervention. The total resources needed will be identified by the choice of delivery strategy, which in turn will be related to the context and to the characteristics of the target

Source of estimate	Type of costs estimated	Services included	Estimated cost
1993 World Development Report[35]	Total	Public health services. Essential clinical package	US$62 billion per year for all developing countries ($15/person); $12/person for low income countries
2001 Commission for Macroeconomics and Health[3]	Total and incremental, including adjustment for process of scaling up	49 priority health interventions to address major causes of avoidable mortality	Incremental cost of $66 billion per year by 2015 for all low-income countries ($21/person); total cost of $34/person
2002 Costing the MDGs[38]	Incremental	Priority preventive and clinical interventions to address: infant mortality, under-five mortality, maternal mortality, HIV/AIDS, malaria, and other diseases	$20–25 billion per year (health targets) $54–62 billion per year for all MDGs
2004 Copenhagen Consensus: Communicable Disease Challenge[39]	Incremental	Malaria control (ITNs, IPTp, ACT) HIV/AIDS control (UNGASS package) Strengthening basic health services (WDR 1993 essential interventions)	2003 Int$2·94 billion* 2003 Int$7·35 billion 2003 Int$337 billion (= 2003 Int$65/person)

*Int$ are purchasing-power adjusted US dollars. ITNs=insecticide-treated nets. IPTp=intermittent presumptive treatment of pregnant women. ACT=artemisinin-based combination therapy. WDR=World Development Report.

Table 1: **Global cost estimates for scaling up health interventions and delivery**

population. The resource requirements will likewise be established by several additional issues.

Should the cost include the costs of existing infrastructure and systems, or is the relevant cost the additional (incremental) resources needed? Both approaches are valid, but address different issues. If existing resources are included, double counting should be avoided. Policy-makers are often most concerned with incremental costs because these show how much they will have to invest in the short term.

Once intermediate programme quality and population coverage have both been achieved, the costs of improving quality or reaching more marginal populations might be substantially higher, and might need different delivery approaches. In the absence of better information, most policy studies have ignored these two general issues and assumed a constant marginal cost, but true costs might be underestimated by this assumption. Better information is needed about how costs change with scale.

Most costing efforts have assumed services will be delivered by the public sector, but in some contexts it might be more appropriate to explore alternative providers (such as non-governmental organisations) with potential efficiency savings or greater accessibility in peripheral areas (table 2). People planning the strategies for scaling up need to consider the most appropriate delivery mechanisms in each context, and apply the relevant costs.

Policy reforms that address weak incentives for good performance[4] will be needed in many contexts. For example, civil service reform that addresses both the amount of health worker remuneration and issues of performance assessment might be needed, and quite probably such reforms will have to be applied beyond the health sector. The costs of these transitional measures need to be taken into account.

Most cost estimates assume that the needed resources are physically available. However, in many contexts human resources are likely to be a problem,[3] with severe shortfalls in many countries. Allocating funds for hiring more staff will not solve the difficulty if no one is available to be hired.[40]

These questions all need to be addressed when designing national strategies for going to scale, and assessing the resources needed.

Operational opportunities and constraints

Irrespective of the technical issues a substantial rise in expenditure is needed to go to scale. But how money is spent will also determine whether additional spending will be translated into effective coverage, especially among the poor. Furthermore, there may also be limits to the ability of systems to spend additional resources efficiently and effectively, sometimes referred to as difficulties of absorptive capacity (panel 2). Work done for the Commission for Macroeconomics and Health reviewed some of these issues[42] and developed a framework for assessing the obstacles or constraints to scaling up. The framework has two dimensions: the level at which a constraint operates (table 2), and the degree to which the constraint can be addressed or relaxed through new funds. On the basis of the framework, empirical analysis was undertaken to classify countries according to their degree of constraint.[43] One or two proxy indicators were identified for each of the main levels of constraint, with data obtained for low income and sub-Saharan African countries. Analysis was undertaken on individual constraints, health-system, and governance variables, and an overall constraints index that took into account data for all seven indicators was derived.

Considerable heterogeneity between countries was shown across all methods of analysis. A few countries consistently fell into the least or most constrained groups. Poor sub-Saharan African countries were most highly constrained, whereas Asian countries were less constrained than this and the two Asian giants, China and India, were consistently above the median. Several countries of the former Soviet Union did well on the health systems variables, probably showing past investment, but less well on governance variables. Only 10% of the total population of countries included in this study live in the most constrained countries. However, these same countries have the most severe

Level of constraint	Types of constraint
Community and household level	Absence of demand for effective and available interventions
	Barriers to use of effective interventions (physical, financial, social)
Health services delivery level	Shortage and distribution of appropriately qualified staff
	Weak technical guidance, programme management and supervision
	Inadequate drugs and medical supplies
	Absence of equipment and infrastructure, including poor accessibility of health services
Health sector policy and strategic management level	Weak and overly centralised systems for planning and management
	Weak drug policies and supply system
	Inadequate regulation of pharmaceutical and private sectors and improper industry practices
	Absence of intersectoral action and partnership for health between government and civil society
	Weak incentives to use inputs efficiently and respond to user needs and preferences
	Reliance on donor funding that reduces flexibility and ownership
	Donor practices that damage country policies
Public policies cutting across sectors	Government bureaucracy (civil service rules and remuneration, centralised management system, civil service reforms)
	Poor availability of communication and transport infrastructure
Environmental and contextual characteristics	Governance and overall policy framework
	- Corruption, weak government, weak rule of law and enforceability of contracts
	- Political instability and insecurity
	- Low priority attached to social sectors
	- Weak structures for public accountability
	- Absence of free press
	Physical environment
	- Climatic and geographic predisposition to disease
	- Physical environment unfavourable to service delivery

Source: Hanson and colleagues.[43]

Table 2: **Constraints to improving delivery of priority health interventions**

difficulties, including institutional capacity and weak government, and a high proportion are involved in armed conflict.

Understanding the constraints facing individual countries is crucial for estimating the resource requirements for going to scale, and for making strategic choices about delivery methods, the sequencing of actions, and the pace at which services can be expanded. For example, where demand for services is low as a result of poor education and information, specific measures can be taken to address this lack of demand. Investments in planning and management capacity could help enhance the absorptive capacity of very weak health systems. Delivery mechanisms that take advantage of opportunities outside the public sector, such as social marketing of public health products, might be more effective when public systems are very weak. However, in the longer term, these initiatives should be accompanied by efforts to improve government systems, including capacity to manage and regulate such non-state activity. Constraints analysis helps to identify situations in which investment decisions are outside the direct influence of the ministry of health, for instance where investments in roads and infrastructure are needed to assure service delivery, showing that a broader intersectoral strategy of advocacy in support of health is called for.

Several approaches to overcoming constraints in communities and households, in health-services delivery, and with health sector policy and strategic management, proved to be effective, although in general the evidence base is weak.[44] Positive evidence was noted for approaches that strengthen community participation and establish or improve the use of quality assurance methods. There is some support for the effectiveness of management strengthening interventions and training. However, both need to be part of a broader strategy to enhance autonomy for district-level managers, integrated efforts to improve health worker skills, stronger incentives for better performance, and integrated human resources policies. Integrated drug policies were effective in overcoming constraints in some contexts. Oliveira-Cruz and colleagues[44] have identified priority actions for relaxing or reducing constraints in different contexts (table 3).

Panel 2: **Limits to absorption and spending**

- Absolute availability of inputs (eg, human resource shortages)
- Systems to allow funds to be channelled effectively, and their use monitored
- Infrastructure to ensure that resources can be delivered to the right place at the right time
- Incentives to use resources more effectively and efficiently
- Values and norms that support the prioritisation of essential services to poor and marginalised populations, which in turn may be related to broader issues of governance
- Macroeconomic arguments about how large inflows of resources are likely to affect the economy as a whole. For example, ministries of finance in some countries have been concerned that large aid inflows distort the exchange rate leaving other sectors of the economy uncompetitive[51]

Conclusions

Known, cost-effective interventions with potential for greatly improving global health are still failing to reach a high proportion of the world's population. We have argued that going to scale with these interventions is essential for improving global health, and that strong health systems are essential for reaching this objective in a sustainable way.

Multitrack approaches are needed that address both the need to achieve short-term universal coverage at high levels of quality, and the longer-term goal of system strengthening, rather than forcing competition among the two. Scaling up in most contexts will need innovative delivery strategies that move incrementally along the vertical-to-horizontal axis and along the selective-to-integrated continuum, as health systems gain capacity in service delivery.

Longer time frames are needed for planning, implementing, integrating, and sustaining efforts if going to scale is to be successful. The time lines of governments, donors, and international agencies are often too brief, with funding cycles seldom longer than 5 years. Shorter time frames often lead to prioritising high coverage and impact through vertical approaches, rather than sustainability and building health-system

	Highly constrained countries	Least constrained countries
Constraint		
Community and household	Encourage community mobilisation through NGOs Use social marketing and retail sector to make effective drugs available to households	Use incentives to stimulate demand
Health services delivery	Build up health care delivery infrastructure through public services or agreements with NGO and church providers or both Use outreach services and NGOs where public sector difficult to extend	Improve human resource management policies to ensure better staff performance Strengthen local management
Health sector policy and strategic management	Enhance degree of management decentralisation Strengthen drug supply and distribution system through public and private sector or both Greater donor coordination	Enhance degree of management decentralisation Greater donor coordination Strengthen regulation of private sector
Public policies cutting across sectors		Give greater autonomy to health sector
Environmental characteristics	Prepare for possible scale-up under improved conditions; maintain links with NGOs; support education and training	Encourage more pluralist policy process

NGO=non-governmental organisations. Source: Oliveira-Cruz and colleagues.[44]

Table 3: **Relaxing constraints: priority actions by type of country**

capacity to deliver integrated programmes. A historical perspective is needed, with programmes or projects building on what was developed and learned in the past. Unfortunately, rapid staff turnover in ministries, donor agencies, and technical assistance groups, coupled with rapid changes in funding mechanisms, often contributes to the erosion of institutional memory. Advocacy efforts internationally seem to have a short time span, with policies and programme priorities changing every few years, which can lead to the withdrawal of national or international support before new initiatives have had time to have an effect on health. For instance, the child survival revolution of the 1980s and universal child immunisation are among the best examples of how worthwhile and successful policy initiatives were abandoned before national programmes were completed.[5]

There is an urgent need for better evaluation of the effectiveness and costs of different delivery strategies in achieving and sustaining high population coverage at adequate quality levels. Whenever possible, such evaluation should be undertaken simultaneously in some countries, to support inferences that are generalisable.[45] WHO convened a taskforce that has suggested a research agenda for health policy and systems issues, emphasising important areas in which further evidence is needed.[46]

On the policy and planning side, a first essential step is a plan for country-level priority setting and programming that includes assessments of burden of disease, health system capacity for scaling up, and situation-specific options for delivery strategies for the priority interventions. Uniform strategies may be popular with international organisations and with donor agencies, but they are unlikely to satisfy the needs of most countries, especially the poorer and most constrained ones. Country-specific and contextualised strategies for going to scale are needed to reach the poorest people and to reduce inequalities in health.

Acknowledgments

This work has been supported in part by the Multi-Country Evaluation of IMCI Effectiveness, Cost and Impact, a project of the Department of Child and Adolescent Health and Development of WHO, with financial support from the Bill and Melinda Gates Foundation. Kara Hanson works for the Health Economics and Financing Program, which is funded by the UK Department for International Development. The funding source had no role in the writing of this report. We declare that we have no conflict of interest.

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Use of research to inform public policymaking

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Lancet 2004; 364: 1615–21

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To improve health and reduce health inequalities, public policymakers need to find the best solutions to the most burdensome health problems, the best ways to fit these solutions into complex and often overstretched and underresourced health systems, and the best ways to bring about the desired changes in health systems. Systematic reviews can inform public policymaking by providing research-based answers to these questions. Public policymakers can encourage more informed policymaking by asking to see systematic reviews on priority issues, commissioning reviews when none exists, and placing more value on such work in their deliberations and in their interactions with stakeholders. Donors and international agencies can encourage more informed public policymaking by supporting national and regional efforts to undertake reviews and assess their local applicability, and by supporting regional or worldwide efforts to coordinate review and assessment processes.

Health ministers in low-income and middle-income countries who take their responsibility to improve health and reduce health inequalities seriously face both many challenges and little support. Quite legitimately in many cases, ministers can criticise the health-research community (especially funders), their political staff and civil servants, and others who seek to advise or influence them for not giving them what they need to be successful. Like clinicians, health ministers can benefit from high quality, locally applicable systematic reviews of research. Unlike clinicians, health ministers can turn to very few systematic reviews of the reports most relevant to them (ie, health systems research) and they cannot rely on advice about how to critically assess the local applicability of reviews.

In this report we describe the challenges that public policymakers (ie, health ministers, their political staff, and senior civil servants) face in answering three types of questions relevant to improving health and reducing health inequalities in their countries; outline an approach that public policymakers can use to critically assess the local applicability of systematic reviews of health systems research; and propose several steps that public policymakers, donors, and international agencies can take to ensure that in future public policymakers will stand a better chance of finding high quality, locally applicable reviews to inform their decisions. Although our observations are applicable across a range of potential health goals, we use the three millennium development goals most directly related to health systems—reducing child mortality, improving maternal health, and combating HIV/AIDS, malaria, and other diseases such as tuberculosis—to illustrate both the associated challenges and the opportunities on the horizon.[1,2]

Challenges faced by public policymakers

Improving health and reducing health inequalities, whether in general or in the specific domains implicated by the millennium development goals, constitutes a daunting task for public policymakers.[3,4] Three questions need to be answered: (1) what are the best solutions to the most burdensome health problems; (2) what are the best ways to fit these solutions into complex and often overstretched and underresourced health systems; and (3) what are the best ways to bring about the desired changes in health systems? We call these first-order, second-order, and third-order questions, respectively, because the complexity of both the issues and the investigations needed to address them become progressively more complicated from one level to the next. The iterative and time-pressured nature of the public policymaking process and the interrelations among the potential answers mean that the questions are often considered simultaneously.

Public policymakers are well served by researchers who help them find the best solution in terms of effectiveness and cost-effectiveness. Health ministers turn to their political staff and senior civil servants for input about other elements of what constitutes the best option. Feasibility is one such element, in view of the jurisdictional authority, administrative capacities, and financial discretion that government structures, public policies, and the financial situation have created for public policymakers and the broader government of which they are only a part.[5] Other elements include the probable acceptability of the available options to key health-system stakeholders (eg, civil society groups, patient groups, professional associations, non-governmental organisations, private businesses, donors, and international agencies), and its consistency with the governing party's political views.[5]

For public policymakers, systematic reviews offer two large advantages. First, such reviews reduce bias in the estimation of the effectiveness of an intervention by identifying all reported and unreported studies that address the research question, by selecting studies that meet explicit criteria, by appraising the quality of the studies using explicit criteria, and by synthesising the study results with a transparent process (not necessarily a quantitative process as is done with a meta-analysis). The likelihood that public policymakers will be misled by research is lower with systematic reviews than with individual studies.

Second, systematic reviews reduce the role that chance has in estimates of effectiveness by increasing the number of units for study, thereby providing more precise estimates of effect, and sometimes allowing the estimation of the effectiveness of an intervention in specific subgroups. Public policymakers can be more confident about what can be expected from an intervention when they use a systematic review.

For the less senior civil servants and other advisers who support public policymakers, drawing on the systematic reviews produced by others constitutes a more efficient use of their time. Instead of undertaking an informal review of reported data on their own, they can focus on assessing the local applicability of existing reviews and on gathering and interpreting the other types of information that public policymakers need to inform their decisions. Systematic reviews also offer advantages to research funders and researchers. Funders, whether inside or outside government, can use systematic reviews to identify gaps in existing knowledge and thereby adjust their priorities and make more efficient use of their resources. Researchers can cite systematic reviews in their applications for funding and for ethics review, both of which increasingly need reviews to support statements about the need for additional investigation.

The Cochrane Library provides an increasingly rich resource for public policymakers. It contains all systematic reviews that have been quality assessed, either through the standards of the Cochrane Collaboration's domain-specific review groups (for Cochrane reviews) or through the application of a set of quality criteria by two independent reviewers (for reviews from the Database of Reviews of Effects). These quality assessments should evolve as systematic reviews are done in complex domains such as health care financing in low-income countries, but the very emergence of a review in this domain is a triumph.[6] *The Cochrane Library* also contains all economic evaluations that have been quality assessed through the application of a set of criteria by two independent reviewers.

Neither systematic reviews in general nor *The Cochrane Library* specifically are a panacea. Many questions relevant to public policymakers have not yet been asked (ie, no protocols have been developed) or addressed (ie, a protocol exists but the review has not yet been completed). Moreover, a systematic review can fail to yield a research-based answer to a public policymaker's question because high-quality work has either not been done or is not locally applicable. A systematic review can yield an inconclusive research-based answer because high-quality work has generated as-yet-unexplained divergent results. Conversely, on occasion a single rigorously designed and conducted study in a relevant setting can by itself provide useful information for policymaking, such as when a public policymaker has commissioned research to assess the impact of a major policy initiative.

In a political context, the knowledge that there is no research-based answer or an inconclusive answer can be a powerful resource in dealing with stakeholders who purport to have identified the best solution and in building the case for further assessments of either the present situation or new innovations. Notably, systematic reviews are not inherently conservative in their implications. An absence of evidence of effect is not the same as evidence of no effect; the first suggests the need for more (or different types of) research whereas the second suggests the need for a different solution.

Finding solutions

Research-based answers to first-order health-system questions, specifically what are the most effective and cost-effective solutions to the most burdensome health problems, are among the easiest to find. A key word search in *The Cochrane Library* will yield all quality-assessed reviews on a specific topic. Thorough answers to these questions for the millennium development goal of reducing child mortality have been especially well documented. Investigators have calculated that 42 countries accounted for 90% of the 10·8 million child deaths in 2000.[7] They also calculated that making 15 preventive interventions and eight treatment interventions universally available in the 42 countries would reduce child mortality by 63% and thereby achieve the millennium development goal.[8]

Finding solutions is especially amenable to between country and worldwide collaborations. The 23 preventive and treatment interventions that were recommended to reduce child mortality, for example, were supported by (among other types of research) seven publications that had in their title the terms Cochrane review (four), systematic review (one), meta-analysis (one) or pooled analysis (one).[8] Only one of these reviews—the Cochrane review of insecticide-treated bednets and curtains for preventing malaria—drew on 22 trials done in 16 different countries.[9] Clinical and public health interventions such as this one against malaria are often readily accepted as transferable beyond the countries where the research was done.

Systematic reviews can also be used to inform decisions about different approaches to standard treatment, such as oral rehydration solutions. In children admitted to hospital with diarrhoea, reduced osmolarity oral rehydration solution, when compared with WHO standard oral rehydration solution, is associated with fewer unscheduled intravenous fluid infusions, lower stool volume, and reduced vomiting with no additional risk of developing hyponatraemia.[10] Also, rice-based oral rehydration solution seems to be

effective in reducing stool output in people with cholera, however, this effect was not apparent in infants and children with non-cholera diarrhoea.[11]

Fitting solutions into health systems

It is in trying to answer the second-order health system questions—the types of questions asked by public policymakers when they face the challenge of how best to fit interventions, often advocated in the form of a vertical programme, into a health system—that the dearth of systematic reviews of health systems research first becomes apparent.[12] Such questions include: (1) what governance arrangements for a programme are most conducive to achieving a particular health goal while also accomplishing other societal goals such as community involvement; (2) what financial arrangements for a programme (ie, mechanisms to raise revenue, fund organisations, and remunerate health workers) are most conducive to achieving a particular health goal while also accomplishing other societal goals such as equity in the burden of paying for and using all types of effective health care; and (3) what delivery arrangements (ie, by whom, where, and how a programme is delivered) are most conducive to achieving a particular health goal while also accomplishing other societal goals such as achieving universal and sustained coverage of a range of high quality, cost-effective interventions? Most systematic reviews that address such questions have been completed under the auspices of Cochrane's Effective Practice and Organization of Care group.[13] Few of the reviews focus on low-income and middle-income countries. Other articles in this series discuss the use of research to inform governance arrangements (eg, mechanisms to empower poor clients to hold service providers accountable),[14] financial arrangements (eg, health-care financing mechanisms),[6] and delivery arrangements (eg, scaling up interventions to the level of entire health systems).[15]

Not enough high-quality work has been done on many key questions related to health systems, and investigators have suggested that public policymakers should incorporate rigorously designed assessments into any future changes to governance, financial, or delivery arrangements. For example, few high-quality studies have been done to assess the effects of strategies for integrating primary health care services in low-income and middle-income countries despite concerns that the fragmentation of primary care service delivery that often accompanies vertical programmes (such as those often advocated to achieve the millennium development goals) might result in worse patient outcomes and higher costs.[16] If many of the public policymakers who are now making choices about the degree of integration needed in the delivery arrangements to achieve the millennium development goals were to support assessments of the effectiveness of the arrangements they choose, the next systematic review on this topic might yield a research-based answer to the more challenging question of under which conditions one strategy is more effective than another. Delivery arrangements could move incrementally along the vertical-to-horizontal continuum and along the selective-to-integrated continuum as health systems gain capacity in service delivery,[15] for example, but this could be the focus for future studies and a review based on these studies.

Bringing about change in health systems

Systematic reviews of health systems research are also often unavailable to help answer third-order questions, which are the types of questions asked by public policymakers when they face the challenge of implementing their decisions about how to fit particular solutions into the health system (ie, what are the best ways to bring about the desired changes in health systems?). Some governments possess the authority to make changes happen in health systems by decree. Most governments, however, rely on some combination of educational and other change interventions targeted at individuals (eg, mass media campaigns for the general public and clinical practice guideline implementation strategies for clinicians), financial and other incentives targeted at either individuals or organisations (eg, performance-based incentives for health-system managers or performance-based funding for health care organisations), and regulations targeted at organisations and coupled with varying degrees of monitoring and enforcement.

Not all the options for bringing about change in health systems are equally effective or effective in all situations. To bring about changes in health systems through changing clinical practice, an overview of 54 systematic reviews generated the following conclusions:[17,18] (1) well-designed interventions typically have some effect, averaging about a 10% improvement across studies; (2) there is more evidence on clinician-oriented interventions (eg, education, feedback on performance, and reminders) than on patient-focused or organisation-focused interventions; and (3) the cost-effectiveness of interventions is rarely assessed (although this is beginning to change).[19] Unfortunately very few of the studies included in the reviews were done in low-income and middle-income countries.[20] We do not yet have the advantage of a systematic review that examines the effectiveness of options for bringing about change in organisations such as community health centres and hospitals. Reviews of these methodologically diverse reports have identified several models (ranging from single instruments to comprehensive methodologies) for understanding, managing, and dealing with change but the reviews have not explicitly examined the relative effectiveness of the models.[21–23]

***Panel*: Assessing the local applicability of systematic reviews of health systems research**

Could it work?

- Are there important differences in the structural elements of health systems (or health system subsectors such as pharmaceuticals or home care) that mean an intervention could not work in the same way as in the countries where the research was done—eg, institutional attributes such as the degree of integration in service delivery?

Will it work? (or what would it take to make it work?)

- Are there important differences in the perspectives and influence of those health system stakeholders who have the political resources to influence decisions that mean an intervention will not be accepted and taken up in the same way—eg, power dynamics involving professional associations and donors.
- Does the health system face other challenges that substantially alter the potential benefits and harms (or risks) of the intervention—eg, on-the-ground realities and constraints such as the availability of financial resources and the supply, distribution, and performance of health human resources (including managers)?
- Can power dynamics and on-the-ground realities and constraints be changed in the short-term to medium-term and what are the prospects for making this happen?

Is it worth it?

- Is the balance of benefits and harms (or risks) classifiable as net benefits, trade-offs, uncertain trade-offs, or no net benefits, and are the incremental health benefits from incorporating the intervention among the mix of interventions provided worth the incremental costs?

Recognising differences in health systems

Public policymakers are likely to ask two questions when faced with the results of a systematic review of health systems research (ie, investigations addressing a second-order or third-order question), especially when no research from their country was included in the review: (1) what can be expected if the same thing is done in our country, and (2) what can be expected if things are done differently? An appreciation of the importance of context often leads investigators to answer that they do not know whether the same intervention will work in a different setting or whether a modified intervention will work in any setting. We cannot be certain that reviews of health systems research are transferable beyond the countries (or even beyond the areas within countries) where the research was undertaken. We also cannot deduce with any certainty how modifications to an intervention will alter its effectiveness unless this question was asked explicitly as part of the review.

Assessing local applicability

A structured approach to critically assessing the local applicability of systematic reviews of health systems research would help public policymakers navigate between the extremes of assuming no transferability when no research from their country was included in a systematic review, and assuming full transferability. The parallels between the issues faced by clinicians trying to assess the applicability of clinical research to their patients and public policymakers trying to assess the applicability of reviews of health systems research to their health systems lead us to propose an approach for public policymakers that follows the same general structure as the users' guides for clinicians.[24] The three questions that we propose to assist public policymakers in critically assessing the local applicability of systematic reviews of health systems research (panel) correspond to the issues of efficacy (does an intervention do more good than harm under ideal circumstances?), effectiveness (does an intervention do more good than harm under usual circumstances in the field?), and efficiency (does the resulting mix of interventions provided and their distribution among members of society accord with the value of the interventions to individuals in society?).[25]

Answering the "could it work?" question necessitates a focus on institutional attributes at the level of the health system implicated by a systematic review. The transferability of a review that addresses an overarching feature of the health system, such as governance arrangements for purchasing authorities in health systems that separate purchasers' and providers' roles, might vary according to whether the country being compared with those included in the review had similar degrees of integration (or fragmentation) in primary care service delivery. On the other hand, the transferability of a review that addresses a health system subsector, such as bulk-purchasing arrangements for prescription drugs, might not vary according to any overarching feature of the health system, but it might vary according to the concentration in ownership of pharmacies because fewer price reductions may be passed onto patients in subsectors with concentrated ownership. These structural elements of health systems are hard to alter, particularly when the significant change is being advocated primarily because it means a single intervention is more likely to work in the same way as in other countries.

Answering the "will it work?" question necessitates an even more refined understanding of a health system because it taps into power dynamics (ie, are those groups with the political resources to influence public policymaking likely to support a change?) and on-the-ground realities and constraints (ie, are the necessary infrastructure and resources in place and are the starting points for change comparable?). For example, the immediate transferability of a review that addresses a new delivery arrangement for the front-line care of

people living with HIV/AIDS, and specifically one that means the substitution of one type of health worker for another, might vary according to the perspectives and influence of the two types of health workers, as well as their supply, distribution, and performance. If associations of physicians or nurse practitioners are listened to by key government officials, or are given the option of circumventing a decision by exiting the public system or even emigrating, the likelihood is low that a review that included studies from countries in which these conditions were not present would be considered locally applicable. Answering the "will it work?" question also neccessitates a comparison of the countries' starting points in terms of the magnitude of the health problem being faced or the existing pattern of use of the intervention or both. The benefits achieved for a specific expenditure on a new treatment for HIV/AIDS may not be the same in countries with different prevalence rates or with different uptake rates of existing therapies in particular target populations.

The related "what would it take to make it work?" question needs an assessment of the extent to which power dynamics and on-the-ground realities and constraints can be changed in the short-term to medium-term and the prospects for making this happen. Power dynamics, such as when one influential group can effectively block change if it threatens their position, can be very difficult, but not impossible, to alter. Realities and constraints in the field may be more amenable to change over time.[15] Distribution networks for drugs can be improved. Difficulties with the supply, distribution, and performance of health workers can be addressed.[26] Doing so needs a sustained commitment.

Answering the "is it worth it?" question can be made easier by classifying the balance of benefits and harms (or risks) as net benefits, trade-offs between different types of benefits, uncertain trade-offs, or no net benefits, and then assessing whether the incremental health benefits from incorporating the intervention among the mix of interventions provided are worth the incremental costs.[27] Systematic reviews and economic evaluations can help to get the numbers right. But the answer to the question is a political choice and values play a central role in choosing between options. Nevertheless, the availability of systematic reviews and economic evaluations can make more transparent the application of values in a decision and compel both public policymakers and stakeholders to justify their decisions or positions more clearly. This reasoning is analogous to that used in clinical decision-making when the answer to the question is an inherently personal one for the patient (although governments may have an important role in determining, for example, the costs to the patient).

As with any new proposal, this approach to critically assessing the local applicability of systematic reviews of health systems should be tested. To test its perceived usefulness, a sample of systematic reviews of health systems research could be identified and the reviews assessed for their applicability to a range of different countries, and these assessments could then be rated for their usefulness by public policymakers in these countries. To examine the effect of the approach, multicountry case studies could be undertaken to examine whether, how, and under what conditions systematic reviews with and without applicability assessments are used to inform public policymaking. Testing the approach will also help to identify the more detailed questions that need to be asked in these applicability assessments.

Doing things differently

For various reasons, public policymakers might believe that they cannot adopt an intervention that a systematic review suggests would be the most effective or cost-effective. Policymakers might think they cannot mobilise the necessary political or financial and human resources to make an intervention work. For example, policymakers might already have secured a concession from a professional association and might not believe they can ask again, or they may face shortages in key health human resources and therefore be unable to support an intervention that needs highly skilled professionals. Alternatively, public policymakers may have political concerns about adopting an intervention, such as fear of a public backlash. Many public policymakers would then ask: (1) if only one component of an intervention can be undertaken, which component should be selected, and (2) if there is a commitment to undertaking all components of an intervention in the long run but only one component can be undertaken now, how should the components be sequenced?

In some cases, public policymakers can draw on systematic reviews of studies that have examined the components of an intervention or alternative approaches to sequencing the components of an intervention. For example, directly observed therapy is a component of the internationally recommended control strategy for tuberculosis.[28] A systematic review reported in November, 2002, compared directly observed therapy with self-administered treatment at home in people needing treatment for clinically active tuberculosis or needing medication for the prevention of active disease.[29] The review showed that the effects of direct observation on cure or treatment completion were similar to those of self-administered treatment,[29] which suggests that this component of the intervention might not be critical to its effectiveness. More often, public policymakers can draw on process assessments, which are typically qualitative in nature, and seek to understand how and why an intervention might work. These types of studies can also be systematically reviewed albeit using different approaches for selecting, appraising, and synthesising studies. The reviews can

inform decisions about implementing or sequencing components of an intervention.

Improving the outlook

Public policymakers, donors, and international agencies can take several steps to raise the likelihood that high quality, locally applicable systematic reviews will inform public policymaking and decisions about funding for more (or different types of) research. Public policymakers can encourage more informed policymaking by asking to see systematic reviews on priority issues, ensuring that these reviews are commissioned when none exist, and placing more value on them in their deliberations and in their interactions with stakeholders. Creating demand for systematic reviews will, at least in part, encourage their supply. Public policymakers can also encourage funders to become more involved in supporting systematic reviews of health systems research, and encourage and support researchers to do more systematic reviews. However, the usefulness of the reviews hinges on the availability of high-quality health-systems investigations, so funding for primary studies cannot be neglected in a transition toward more funding for systematic reviews.

Some trends suggest that efforts to encourage and support researchers to do more systematic reviews are paying off. The proportion of Cochrane reviewers from low-income and middle-income countries has risen from 5·6% in 2000 to 7·1% in 2002 and 8·2% in 2003.[30] In 2000, there were 5436 Cochrane reviewers in 64 countries; by 2003 there were 9281 reviewers in 83 countries.[30] Open-access initiatives, such as the Health Internetwork Access to Research Initiative, facilitate the participation of investigators from low-income and middle-income countries in initiatives like the Cochrane Collaboration. These initiatives do not address the challenge of accessing the large volume of studies that are done in low-income and middle-income countries and that either are not reported or are reported in journals that are not indexed in bibliographic databases. This omission remains a stubborn challenge, although one that an international registry of randomised controlled trials will address in part.

Donors and international agencies can encourage more informed public policymaking by supporting national and regional efforts to undertake reviews and assess their local applicability and by supporting regional or worldwide efforts to coordinate review and assessment processes. Shared problems and resource constraints in many countries, coupled with the potential for economies of scale (ie, reductions in the average cost as output increases), suggest the need for some cooperation in the priority-setting and commissioning processes for systematic reviews of health systems research. There may even be economies of scale in adapting the presentation of the systematic reviews so that benefits, harms, and costs, and the elements that could change assessments of local applicability, are clearly emphasised. The same may hold true for identifying persuasive case studies of effective interventions to give life to the presentations.

The regional and worldwide efforts could be integrated into a new or existing support function for public policymakers, ideally one that is governed in large part by public policymakers or their representatives. The European Observatory on Health Systems and Policies provides a model for such a support function,[31] which could be adapted for low-income and middle-income countries. The secretariat for the support function could, among other roles, take responsibility for setting priorities for systematic reviews in collaboration with public policymakers and key stakeholders in countries and with technical experts in regions, developing links with groups like the Cochrane Collaboration, identifying or commissioning systematic reviews or both, identifying optimal presentation formats for different types of public policymakers and stakeholders, developing actionable messages (ie, clear statements about the most effective solutions to particular health problems, how to fit solutions into health systems, and how to bring about change in health systems, which are appropriate to both the target audience and their local context), providing national or regional workshops or both and other types of face-to-face interactions for public policymakers and stakeholders to discuss how to take action on the messages, and developing a searchable database of actionable messages with links to the systematic reviews on which the messages are based and to intelligence gathered about how best to facilitate action based on the messages.[32] The WHO Reproductive Health Library provides a model for a searchable database of high-quality reviews.[33]

Conclusion

Politics will always have a role in public policymaking but improving health and reducing health inequalities in low-income and middle-income countries (and indeed in high-income countries) will be made a bit easier if high quality, locally applicable reviews are considered in the policymaking process. If anything, we have underestimated the potential for systematic reviews of health systems research. We have focused on instrumental uses of such work made possible by reviews that answer questions about effectiveness. What have been called conceptual uses of research, whereby investigations change the way that problems, solutions, and their interrelations are framed and understood, among other benefits, also warrant exploration.[5] We have focused on public policymakers, but health-system managers working in community health centres, hospitals, and health districts and stakeholders such as civil society groups can also benefit from systematic reviews of health systems research. Public policymakers, donors, and international agencies have important roles

to play in realising the formidable potential of systematic reviews to shape the future of health systems and thereby help to achieve both national health goals and, where relevant, the millennium development goals.

Acknowledgments

We declare that we have no conflict of interest and received no funding for the preparation of this report. The lead author thanks Andy Oxman, Informed Choice Research Department, Norwegian Health Services Research Centre, for substantial contributions to many of the ideas developed in this paper. Any errors of interpretation, however, remain the authors' own.

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Cover art

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Hendrik Wittkopf is a painter based in London. He studied at Academy of Fine Arts, Munich, and Goldsmith's College, London. He has been a frequent visitor to Kolkata (Calcutta), India.

Cover
"Gariahat Crossing", Kolkata, India. Acrylic on canvas, 40×60 cm

Back cover
"Ruby General Hospital", Kolkata, India. Acrylic on canvas, 50×32 cm

"The European standard notion of Kolkata is either colourful exoticism or abject poverty. However, when living in this city, I became interested in the more subtle aspects of everyday life: the architecture, the changing character of public spaces. Billboards have always fascinated me; they are ubiquitous in Indian cities and many are still painted by hand. Because health has become a highly competitive and lucrative sector, advertisements for Ayurveda treatment, fertility clinics, and heart surgery, dwarf the government-sponsored hoardings that offer basic health advice. The multiplicity of services available, which reflect the spectrum of beliefs about health and well being in Kolkata's diverse populations, is therefore a prominent part of the public sphere.

Equally striking are buildings such as Ruby Hospital, a modern complex in the Kolkata's outskirts, where new developments replaced marshlands in the early 1990s. One of the main issues in such metropolitan areas is access to resources such as housing and health care, and the changing role of the state. This is reflected by the suburban utopia of the middle-classes, who dominate the urban imagery, while the slums and squatter settlements of the poor are more and more marginalised. The decade after economic liberalisation was introduced saw the spread of huge housing projects complete with shopping malls and leisure facilities as well as specialist schools and clinics aimed at middle-class clients. As with schooling in India, the ever-growing minority of affluent urbanites have opted out of government programmes altogether and invested heavily in private initiatives, thus treatments previously available only for a chosen few have become common. In this sense, the gleaming façade of places like Ruby Hospital signals a new era, where health is increasingly associated with the availability of state-of-the art modern private hospitals for affluent urban citizens, while provision of basic services such as vaccination are left to an increasingly less potent public health system.

The more I paint in Kolkata the more the paintings reflect the diversity of city life, which can not be captured as one single entity. Thus, these paintings are deliberately ambiguous but resonate with the processes of transformation that urban lifestyles are undergoing."

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"Health systems are consistently inequitable, providing more and higher quality services to the well-off who need them less than the poor who are unable to obtain them"

See *Lancet* 2004; 364: 1273–80